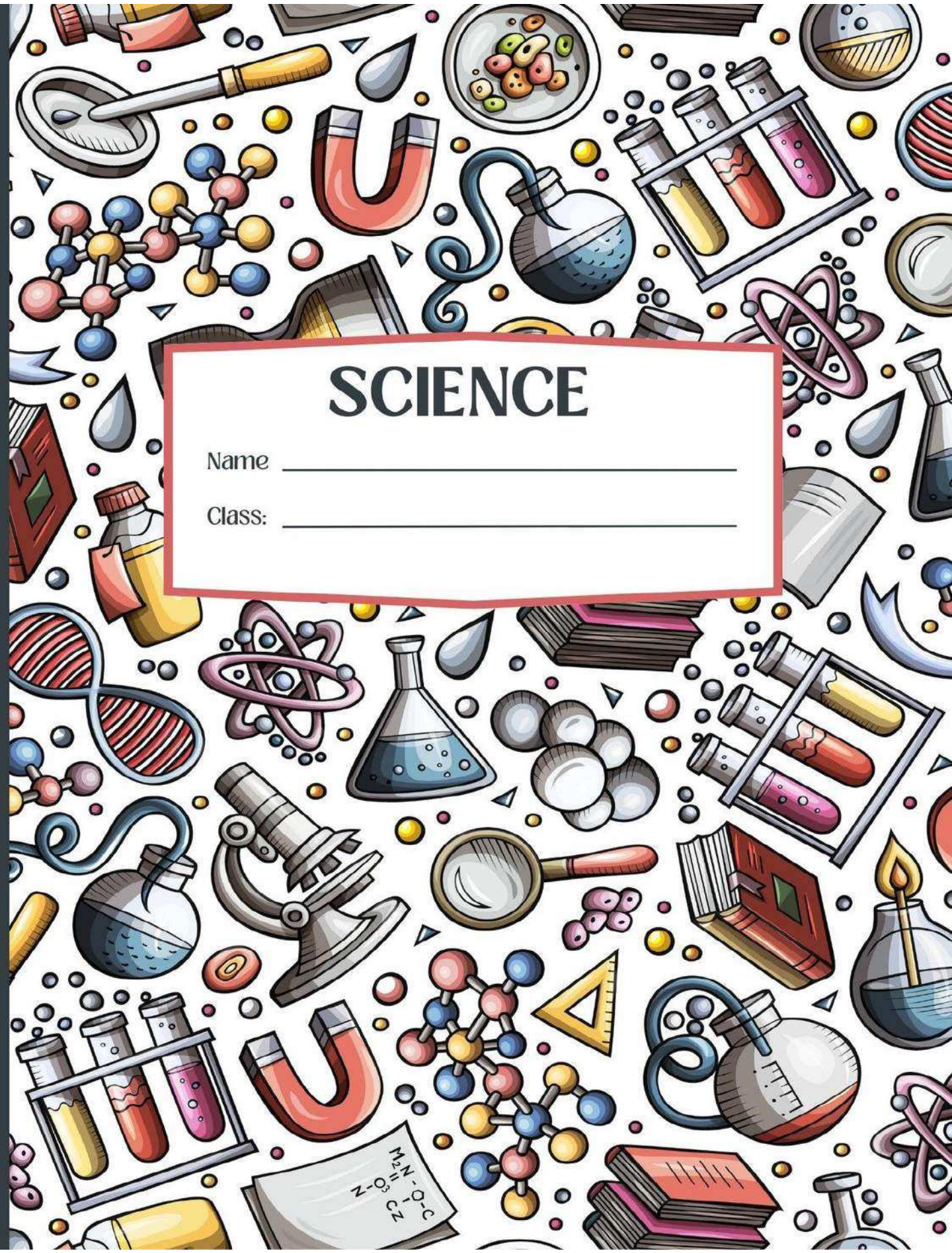
SCIENCE BOOKLET
Primary six



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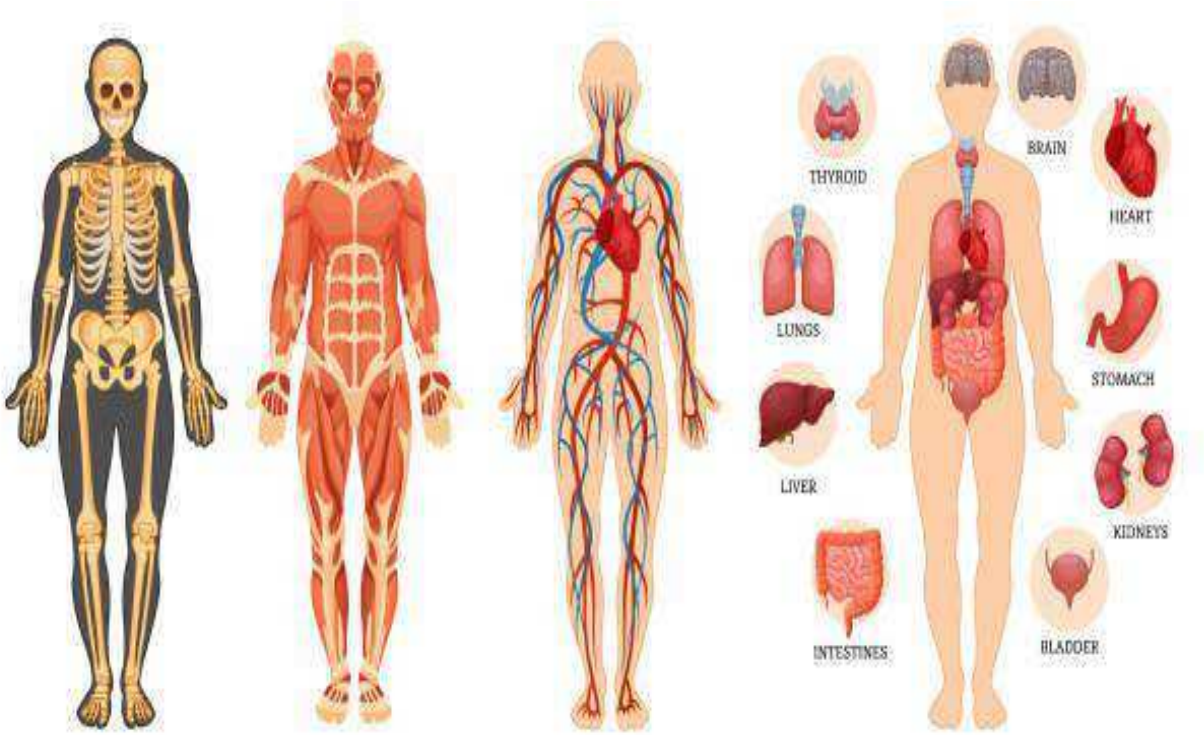
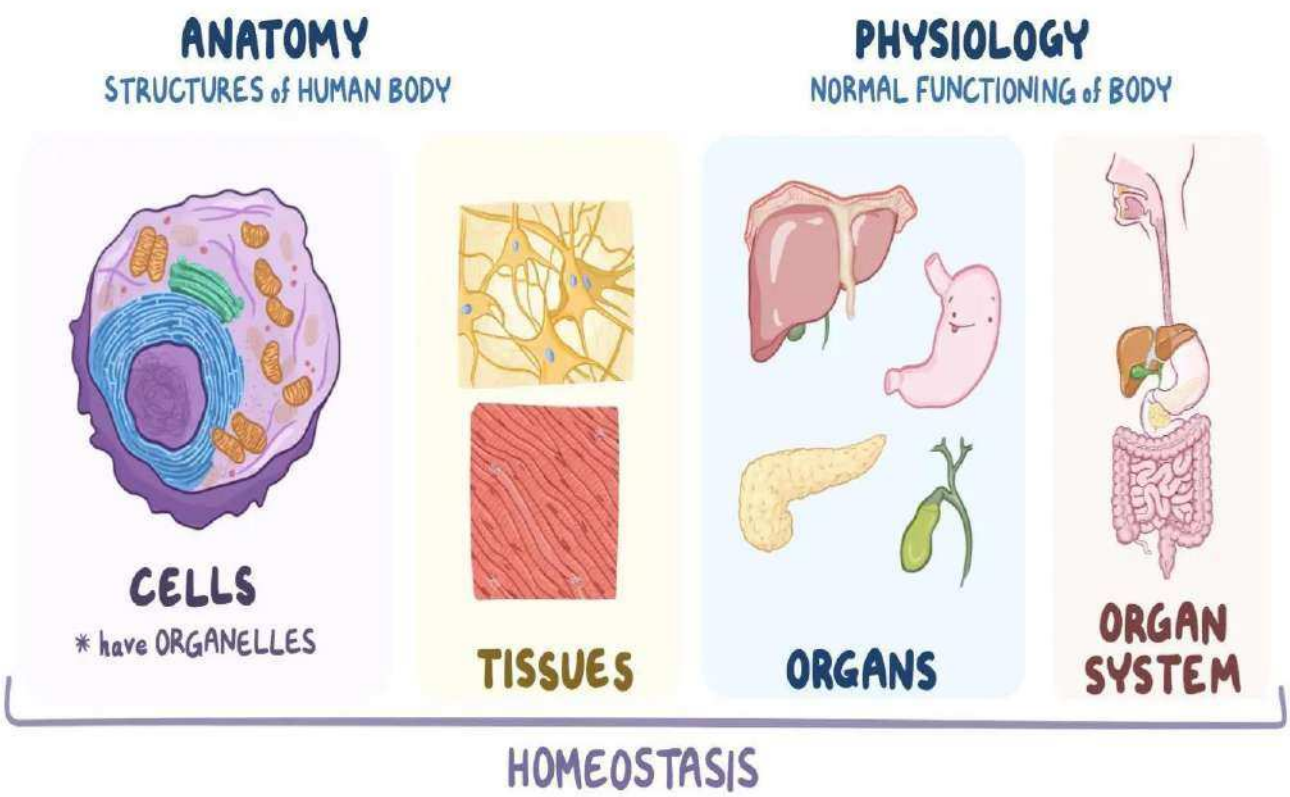
Introduction

- 

- **the bodies of living organisms are complex , so scientists divided their bodies into systems to help in studying the structures of living organisms**



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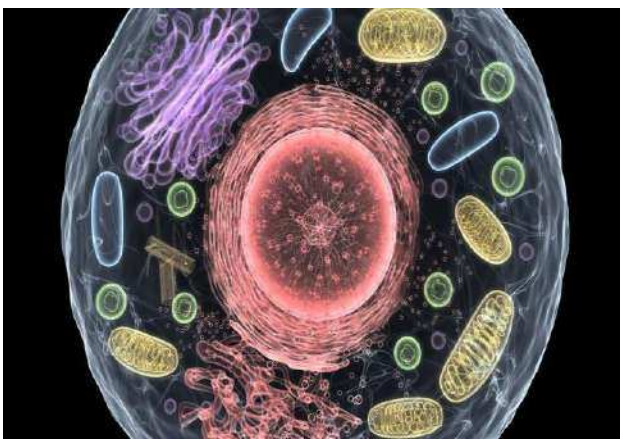
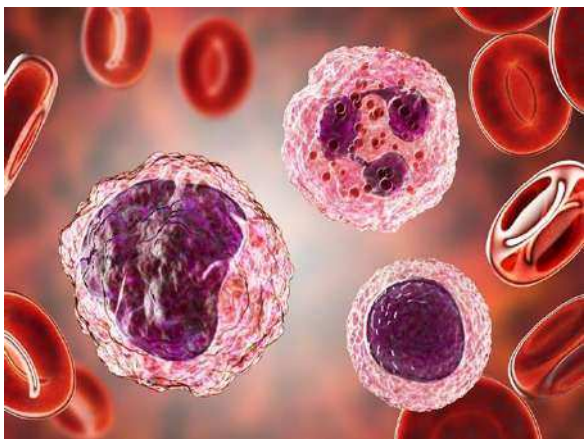
Unit one :what is a system

concept one : the cell as a system

Lesson one : what is the cell ?

- the cell is the building unit of the living organism's body (human, animals , plants and also micro- organisms)
- The cell is the main unit of life , structure , and function of all living organisms on earth





- **cells are not found in non- living things**
- Cells carry out all vital activities that living organisms need to survive such as **(growth , reproduction , repairing the damage**
- cells are tiny particles that cannot seen by naked eye but we need a special device called **"microscope "** to see cells and their structures

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- Some cells may be too large and you can them with your naked eye without microscope such **as bird's egg (only one big cell)**

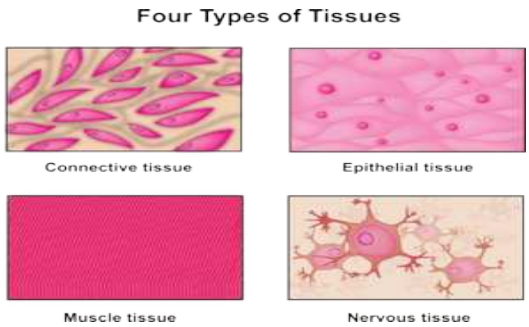
- living organisms grow and reproduce as a result of **increasing the number of the cells** that make up their bodies

- Note :

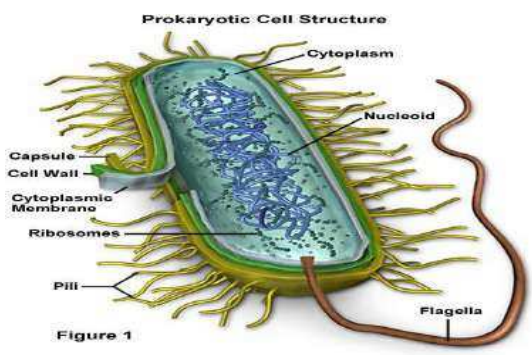
During the growth of a living organisms , the cells **don't** increase in size

- the body of some living organisms are made up of :

- many cells such as human body



- One cell only such as bacteria



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What are the needs of the cell?

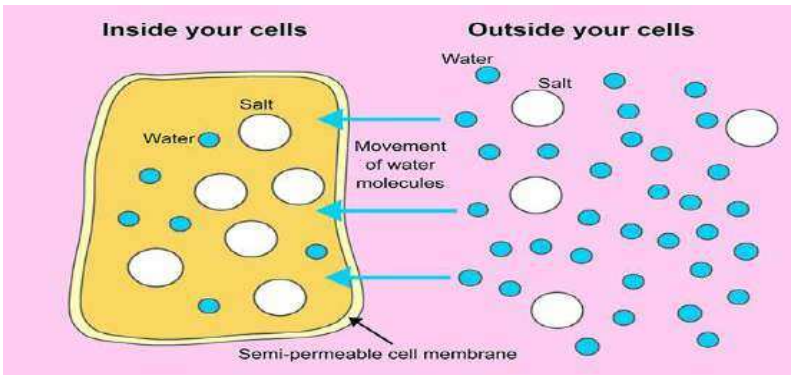
- the cell needs energy to carry out all vital activities to survive and get rid of waste materials
- The cell needs some materials such as :

  - food (nutrients) and oxygen to get energy
  - water to stay alive

but , how does the cell get its needs of water ?

- The **Cell membrane** allows water to enter and leave the cell according to its needs so,

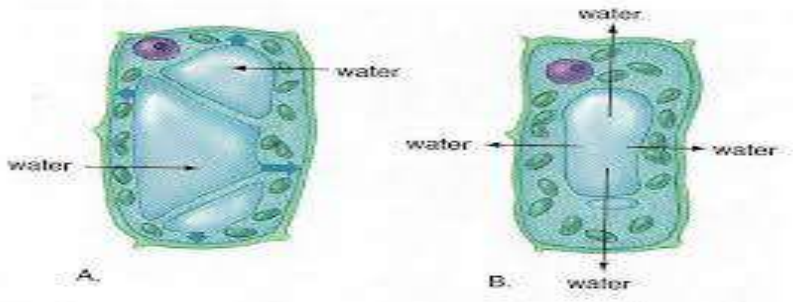
the cell keeps the water balance on both sides of the cell me



what happens if ……?

There is much water enter the cell .

- The cell will swell until it burst



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Class work

- Choose

1- the smallest tiny structures that build up all living organisms' bodies are ……..

a- systems b- cells c- organs d- bricks

2- Growth of a living organisms is resulted from increasing the …… of cells in its body

a- length b- size c- number d- mass

3- the body of …….. Is composed of one cell only

a- human b- bacteria c- a big tree d- an elephant

- Scientific term :

1- the component of cell that allows water to enter and exit the cell ( )

2- A device that is used to see the structure of living organisms cells ( )

Give reasons for :

- The cell needs energy
- ……

- What happens if :

- the doesn't get its needs of nutrients , oxygen and water
- ……

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Home work

- Complete :

1- some cells may be large enough to be seen with our naked eye such as ……

2- all cells allow water to go inside and outside them through the ……

Give reason :

- You cannot see the body of bacteria with your naked eye
- ……

Put true or false :

1- the cell gets its energy from nutrients only ( )

2- the cell membrane allow water to go inside and outside the cell ( )

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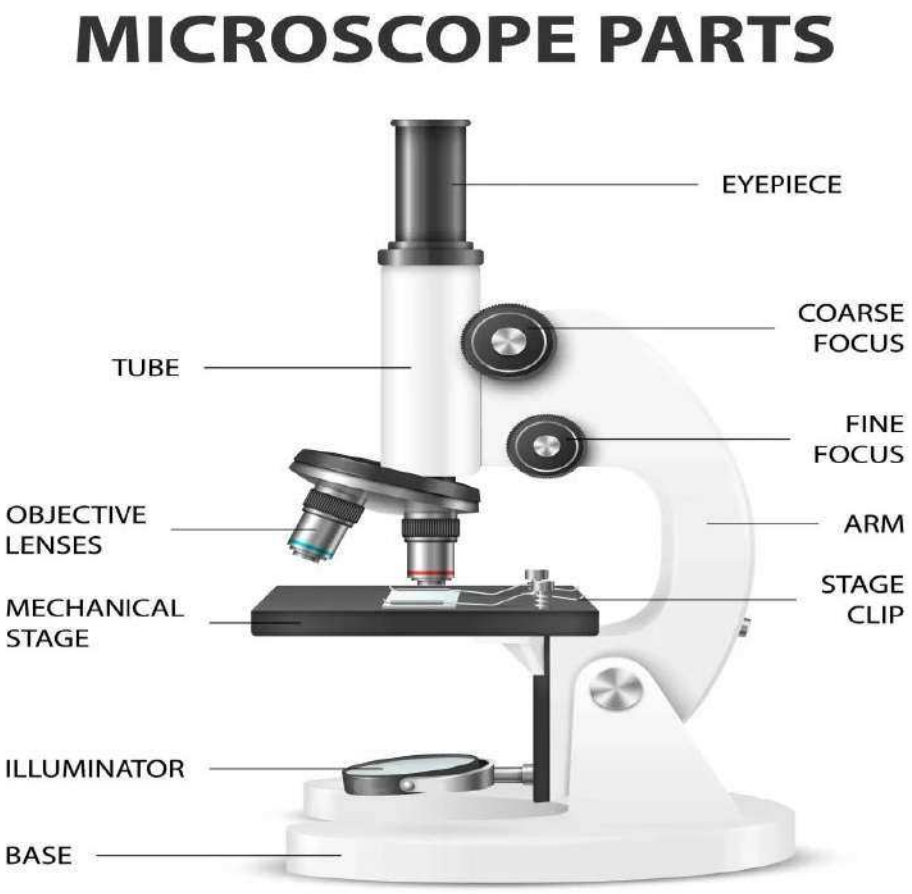
Lesson two : Brief history of the cell

- Robert Hooke

- he used his microscope to observe the tiny particles of some samples of plant parts that cannot be seen by naked eye and he named each of these tiny particles "the cell

- he was the first person who use the word "cell"

Microscopes



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Class work

- Choose :

1- you can see the cell of all the following under microscope , except …….

a- onion b- human skin c- stone

2- all the following are from the parts of microscope , except ……

a- eyepiece b- coverslip c- mirror

Put true or false :

1- All objective lenses of microscope have the same focusing power ( )

2- Robert Hooke used his microscope to observe cells of some samples of plant parts ( )

Give reasons :

- Scientists tend to used microscopes in their researches ?
- ……

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Lesson three : the parts of a cell

Living organisms are divided into

Unicellular

- They are living organisms that their bodes consist of one cell only

Ex :Bacteria

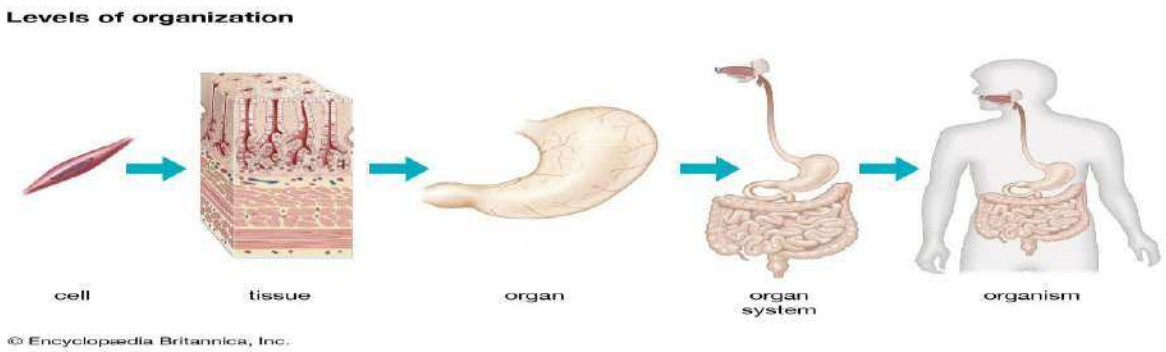
Multicellular

- They are living organisms that their bodies consist of many cells
- Ex: humans and animals

- The structure of multicellular organisms bodies :

- the number of cells in plants and animals differs from species to another
- the human contains about(40 trillion cells)

➢ the structure of most of the multicellular organisms bodies are organized into five levels , which are :



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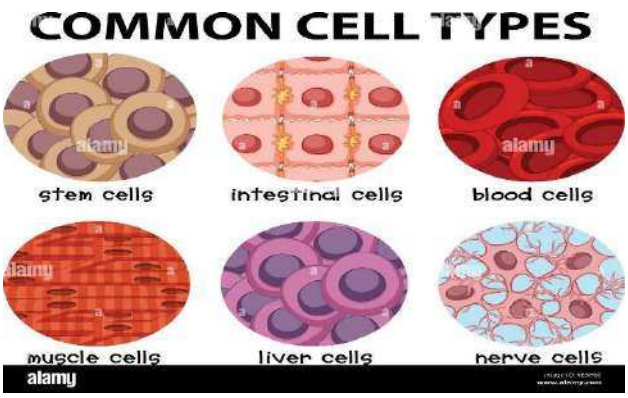
➢ Let's see the structure of the human body as an example of multicellular organisms

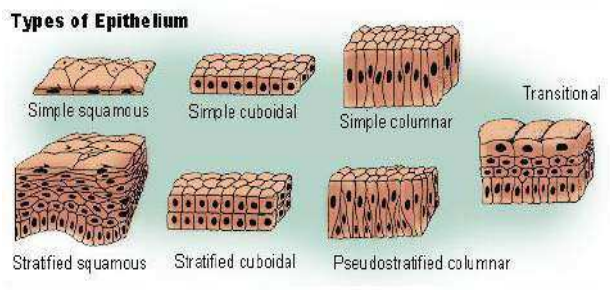
- **cells**

-the human body contains different shapes of animals cell



- **Tissues**

Each tissue is often composed of a group of similar cells to do the same function

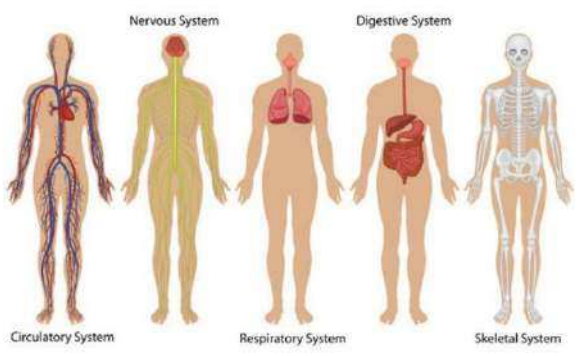


- **Organs**

- Each organ is composed of a group of different tissues joined together to do its own function

- **system**

-Each system is composed of a group of different organs to do a certain function



Whole body

- The human is body is composed of a group of different systems that **work together**

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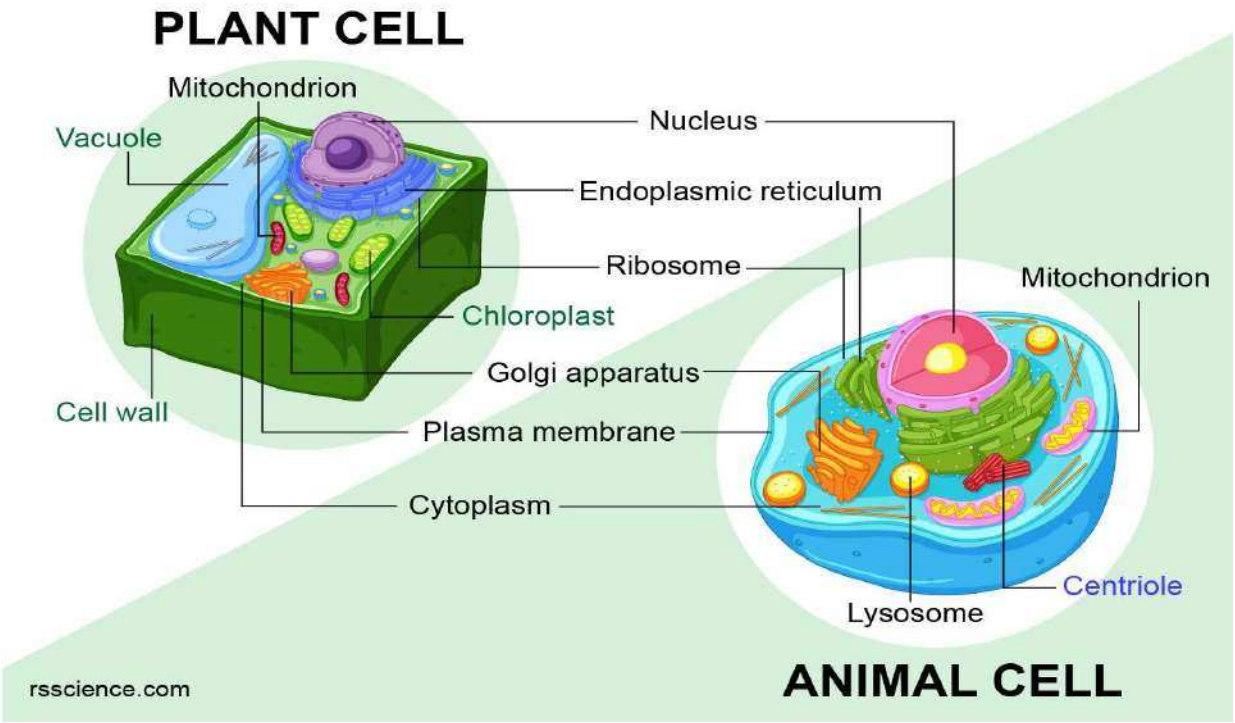
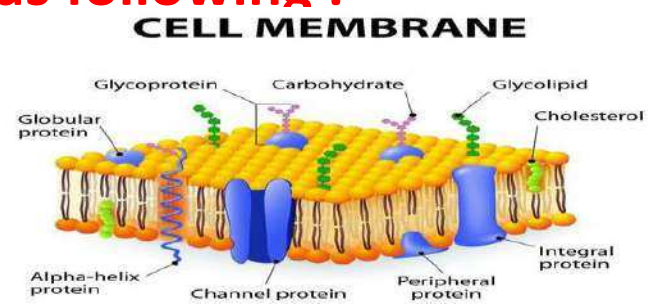
➢ most of animals cells and plant cells are composed of some parts which are :



➢ we are going to study the function of the common parts of most cell as following :

Cell membrane

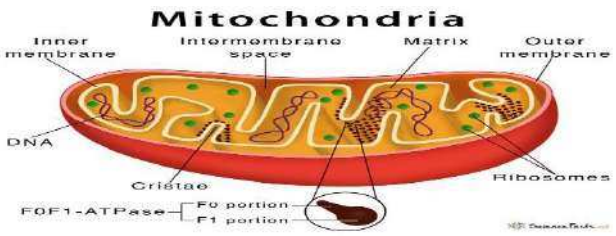


- it is the outer lining the cell
- **function :**

1- it protects the cell

2- it controls the substances that can enter and leave the cell through the" selective permeability" feature

Mitochondria



- they are known as the **powerhouses** of the cell
- Function

- They provide the cell with the energy it needs by converting sugar inside the cell into energy through the cellular respiration process

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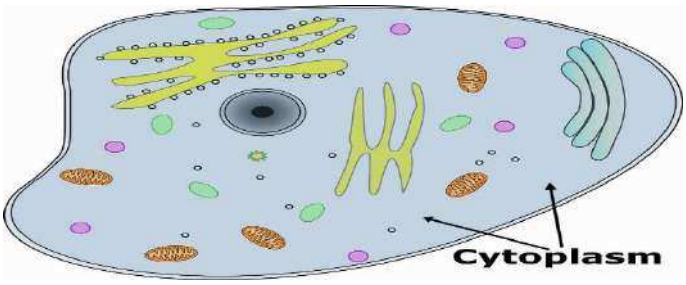
Cellular respiration :

it is process that takes place inside the mitochondria , where oxygen is used to obtain the chemical energy stored in food to help the cell make their function

cytoplasm



- it is the gelatinous liquid (thick liquid) inside the cell
- Function :

  all parts of the cell float in it

Nucleus

- Function:

-it controls all cell activities such as:

- formation of proteins
- cell division to form new cells

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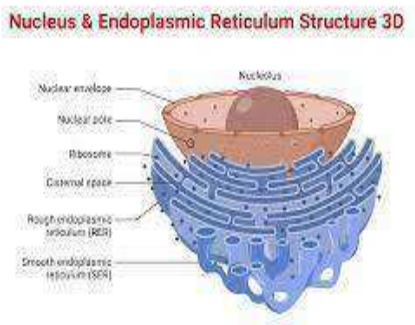
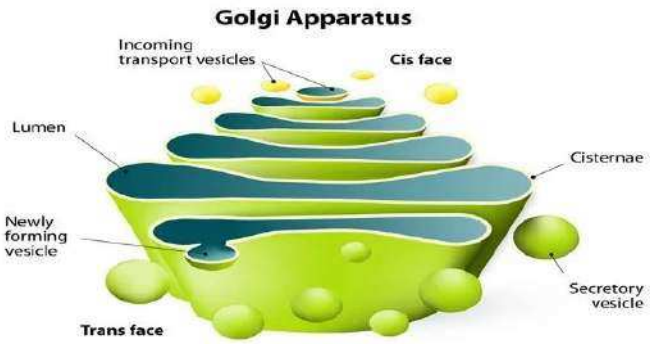
Endoplasmic reticulum



Function :

It helps in collecting and transporting proteins inside the cell to build and repair the cell

Golgi apparatus



- function

- it help in packing and transporting different materials :

- Between the cell

- Out of the cell

- Notes :

✓ cell are very tiny , where the diameter of an animals cell is about (0.001 cm)

✓ cell biologists are scientists who study cells

✓ they use the microscope to magnify cells

✓ cells are usually clear and colorless , so it is hard to see their structures under microscope

✓ stains (dyes) such as **(methylene blue)**are used to add color and make the cell structures more visible

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Class work

- Choose :

1- the body of the unicellular organisms consist of ……

a- one cell b- many different cells c- many similar cell

2- the gelatinous liquid which is found inside the cell is known as ……

a- cell membrane b- cytoplasm c- nucleus

3- the organelles which provide the cell with its needed energy are called ……..

a- mitochondria b- cell membrane c golgi apparatus

4- stomach is composed of a group of different ……

a- systems b- bacteria c- tissues

Complete :

1- human is considered a ……..organisms ,because his body consists of many cell

2- cells of dogs are surrounded by…….by outside

3- transporting the proteins inside the cell to build and repair it is the function of ……..while transporting different materials between the cells is the function of ……..

What happens if :

1- there are no chloroplasts inside the plant cells

……

2- the cell membrane cannot control the selective permeability feature .

……

Give reason :

Cats are considered as multicellular organisms

……

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Home work

Complete :

1- the part of the cell that is responsible for cell division is known as the ……

2- the process by which the cell obtains its needed energy is called ……

Scientific term :

1- they are living organisms, that their body bodies consist one cell only ( )

2- they are cell organelles , the provides the cell with the cell needed energy ( )

mention :

The importance of - Endoplasmic reticulum

- golgi apparatus ,

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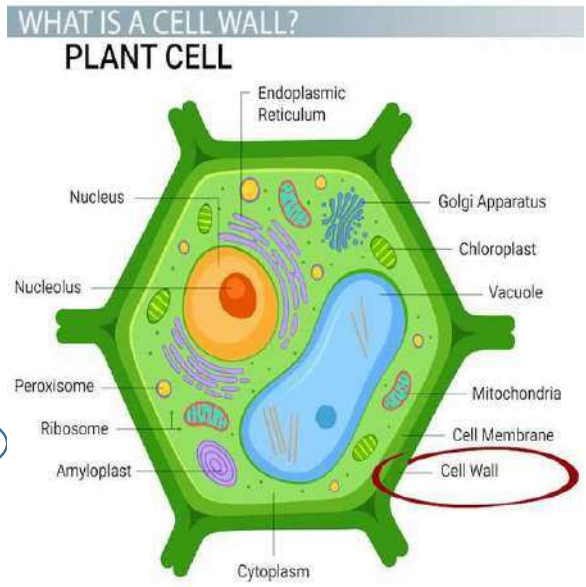
Lesson four :comparing plant and animal cell

- Some parts that are found in the plant cell only and



- characterize it , which are :

Cell wall

- it made up of cellulose
- **Function**

  it surrounds the plant cell to give it a definite shape

Chloroplasts

- They are organelles that contain tiny green granules
- Theses granules have green color because they contain a green pigment called **chlorophyll**
- **Function**
- chlorophyll absorbs the energy of the sunlight for the plant to make its own food the photosynthesis process

Sap vacuole

- it is a large (**only**) sac like
- **function**
- it stores nutrients , water and waste materials inside the plant cell

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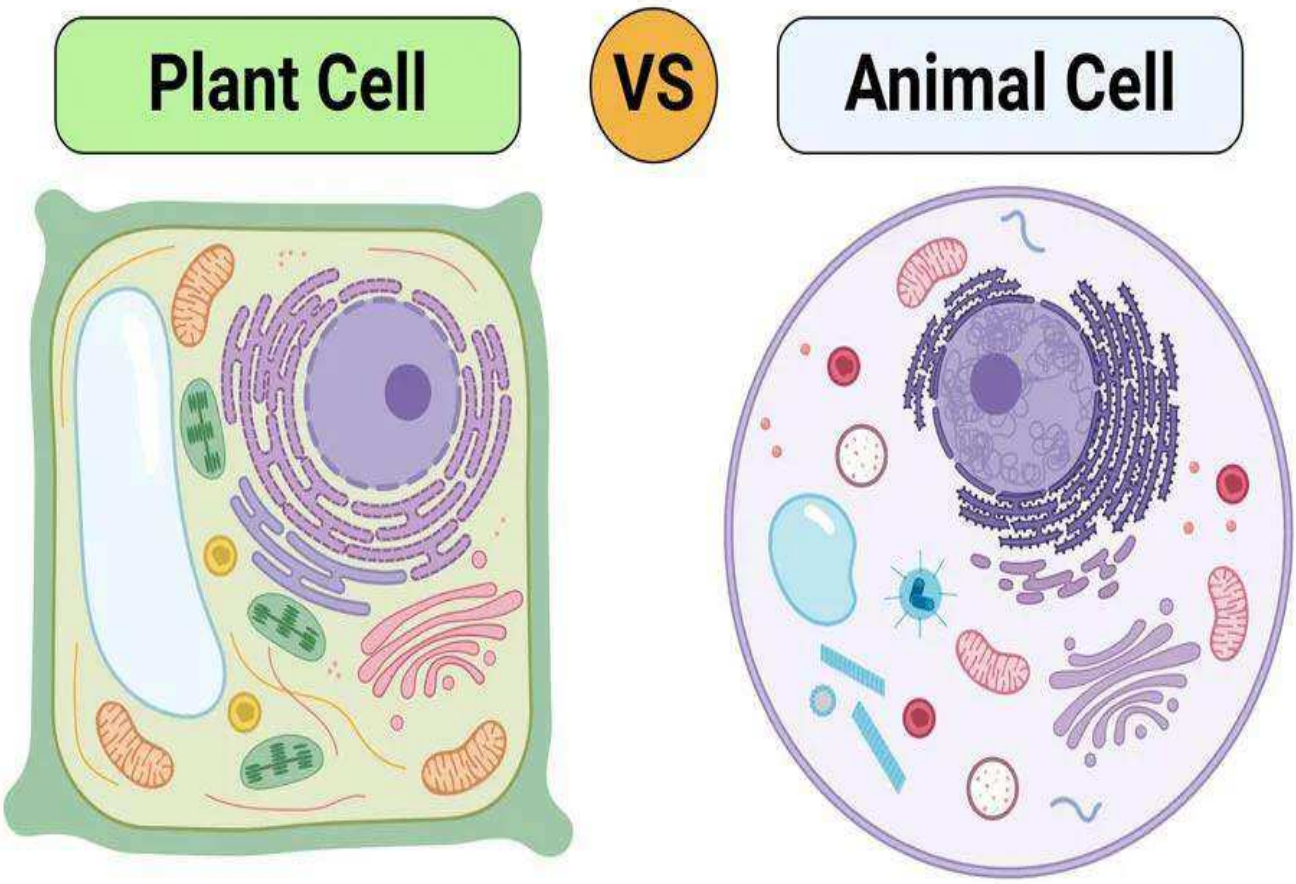
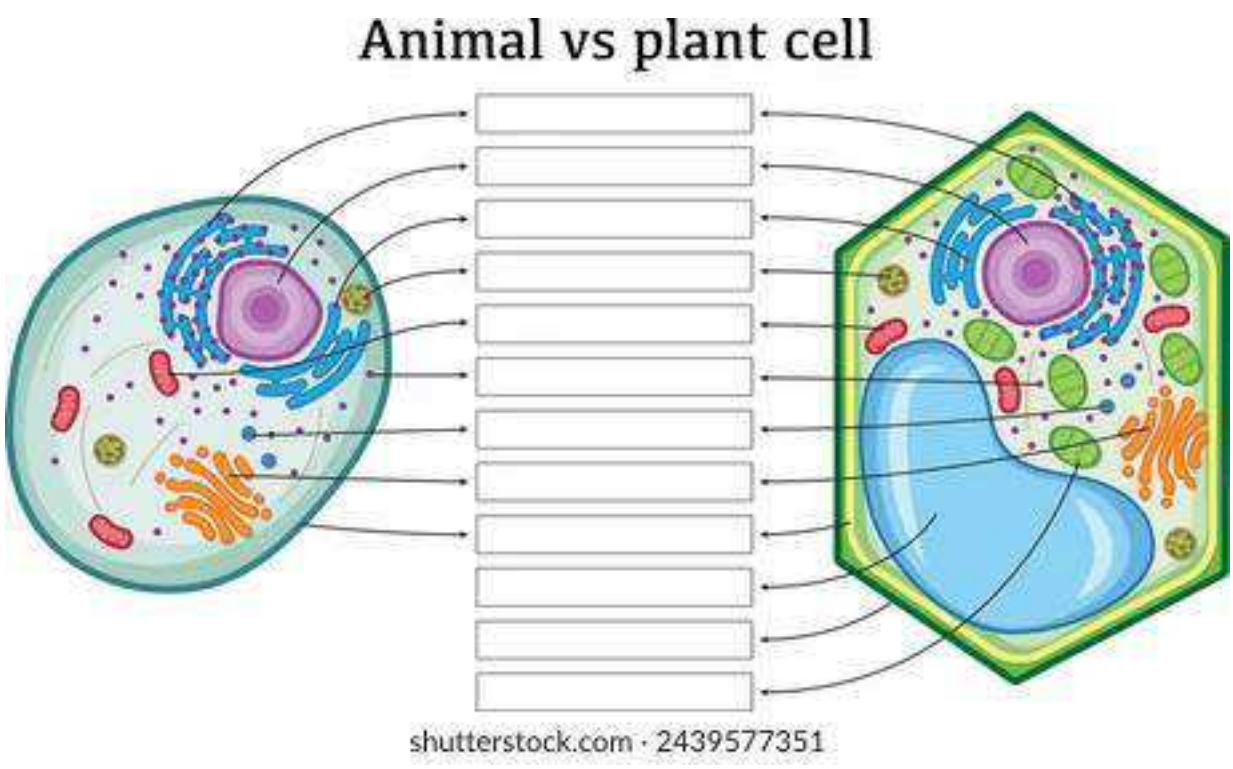
Notes:

- the animal cell has many and small vacuoles
- the animals cell doesn't have a cell wall , so it doesn't have a definite shape as the plant cell
- animals have other structure to keep their shapes such as : (bones , hard shell like cover → exoskeleton)





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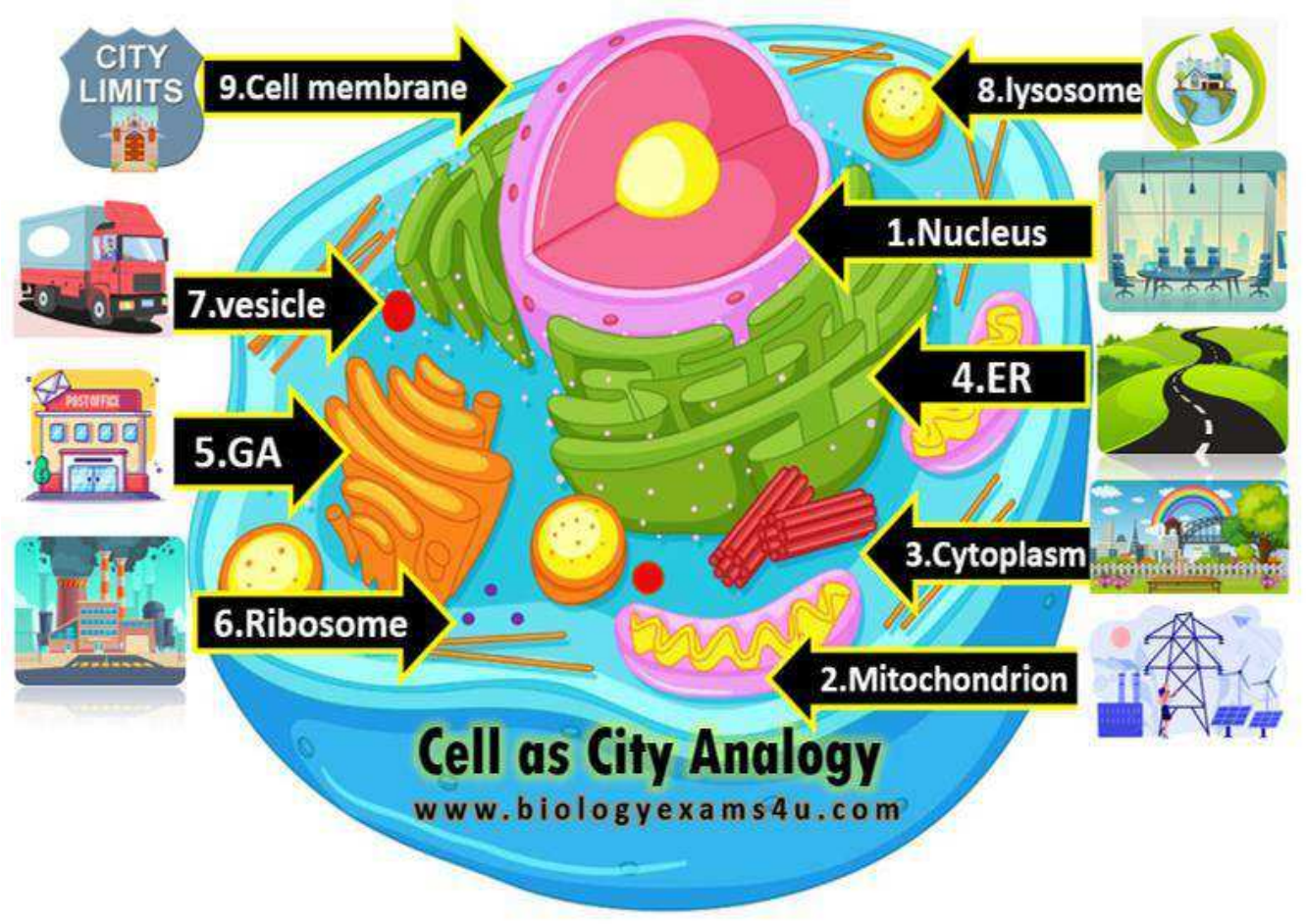
Lesson five : planning a cell city

Cell structure	City structure
Nucleus	City hall
Cell membrane	Guards at city gates
Mitochondria	Electrical power station
Endoplasmic reticulum	Construction workers
Golgi apparatus	Post office or packing factory
Vacuole	Storehouse or storage facility
Cell wall (plants only)	A stone wall surrounding the city
Chloroplasts (plants only)	Food factory



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Class work

- put true or false :

1- the green color of plants is due to the presence of vacuoles in their cells ( )

2- there is one big vacuoles in each cell of onion plant ( )

3- there are many small vacuoles in the cells of a bird ( )

4- cells are usually clear and colorless , so it is easy to see their structure ( )

5- the 3D microscope can help doctors to treat cancer disease ( )

Scientific term :

1- the stain that is used to color the nucleus of the cell in blue color ( )

2- it's the surrounds the plants cell to give to give it a definite shape ( )

3- it is a green pigment , that absorbs the energy of sunlight to make photosynthesis process in plant ( )

Give reasons for :

- Vacuoles act as storehouses in cities
- ……..

- What happens :

- there are no bones found in the body of the cat
- ……

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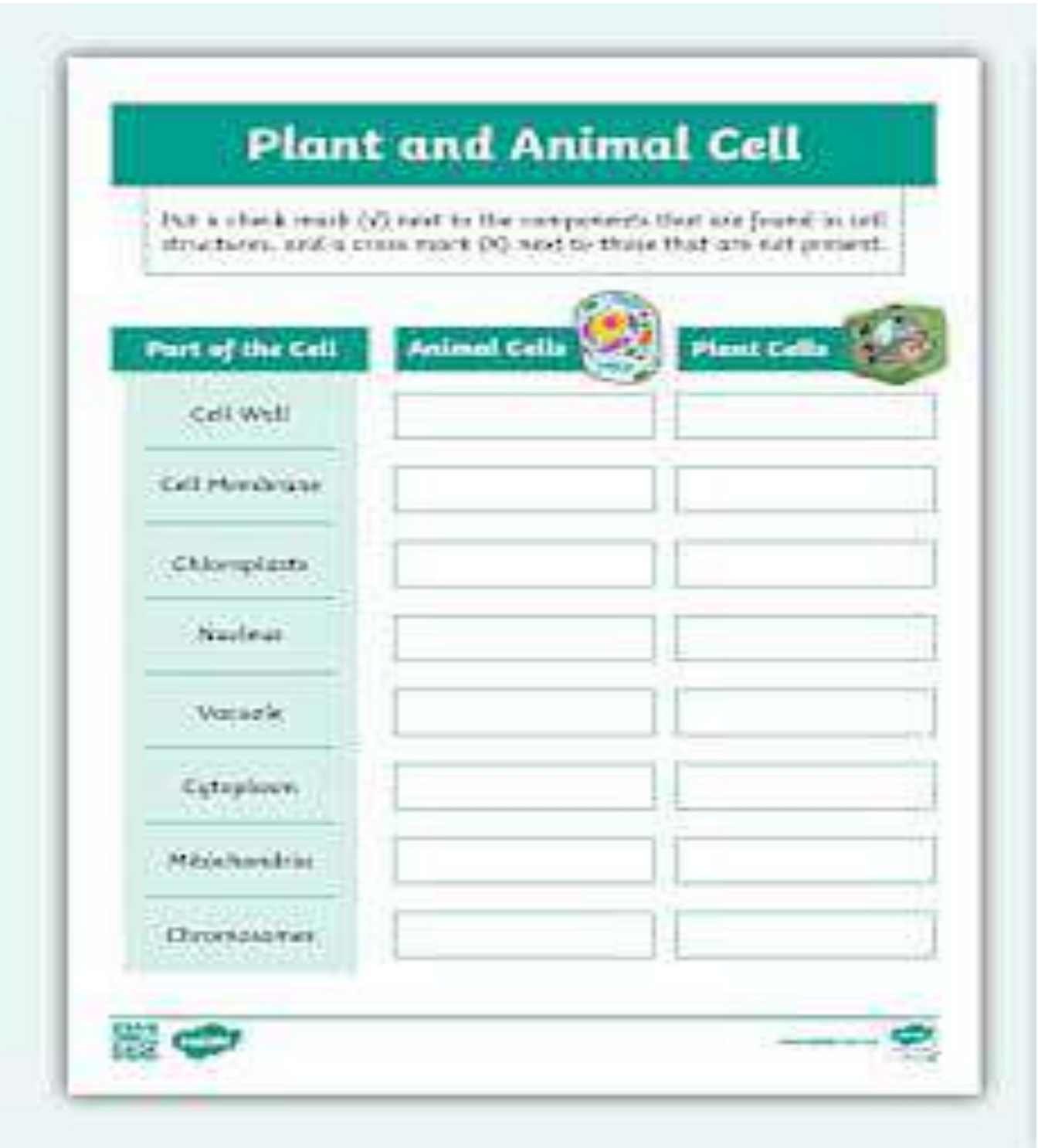
Home work

- Complete :
- 1- the cell wall is made up of ……
- 2- the cell of animals don't have definite shapes due to the absence ……

What happens if :

- There are no chloroplasts in plant cells
- ……



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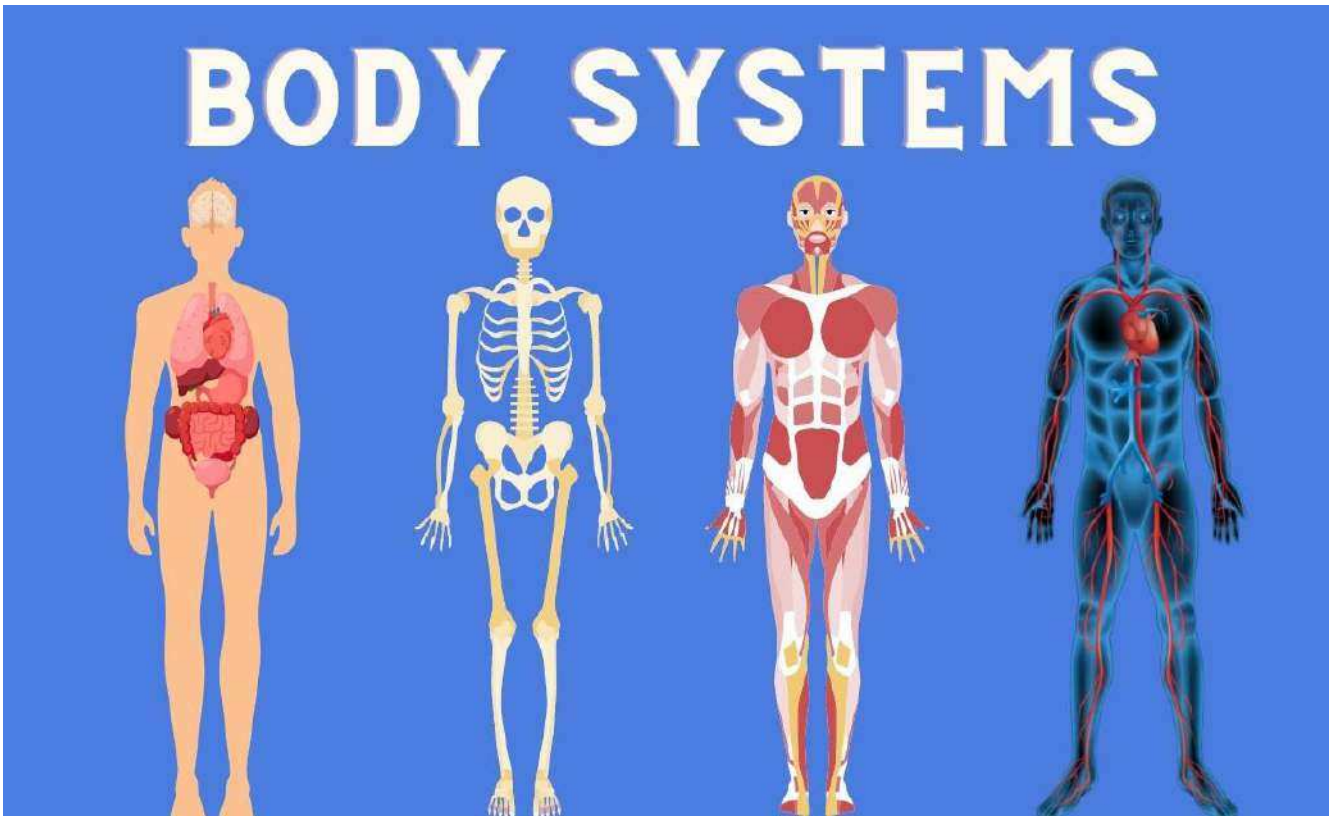
Concept two : the body as a system

lesson one

- Different systems in your body perform different function , where all system interact and work together in an integrated way .



- **Example:**

The interaction between nervous system , circulatory system and digestive system depend on each other to do their function

1. The nerve cell in the nervous system need nutrients to perform their function , where

- the nutrients reach the body in the form of food that is digested by the digestive system

- then , this nutrients are transmitted to the nerve cell through the blood in the circulatory system

2- the nervous system controls the muscles of stomach in the digestive system and the muscles of heart in the circulatory system

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Class work

- put true or false :

1- All systems in you body work together in an integrated way

( )

2- Digestive system can digest food without the help of nervous system ( )

3- the brain and the heart are from parts of the circulatory system ( )

Give reasons for :

- the importance of nervous system for the muscles of heart

……..

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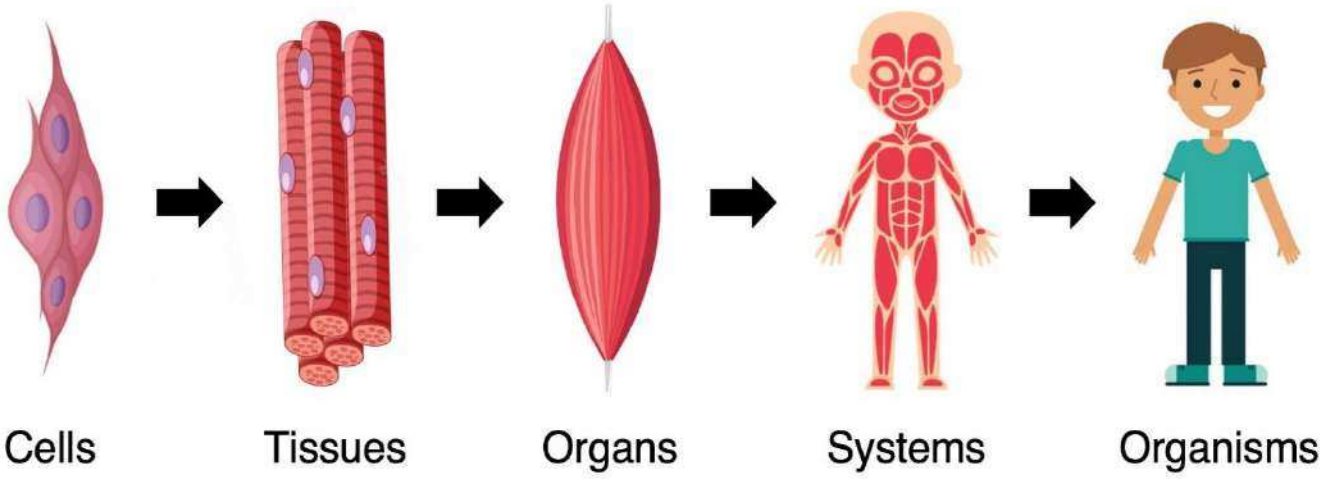
Lesson two :Building living system

- You have learned that human body is **multicellular organisms** that consist of



➢ **How are cells organized to build the human body ?**

1- from cell to tissues

- **All cells have common components but there are many shapes and sizes to perform specific function**

  ex : muscle cell

- **They are in the form of long fiber to allow movement**
- **The must be able to store and use energy quickly**
- **They do not work alone (they are so small) but they work together**
- **They are bundled (collected) together to form tissues**

2- From tissues to organs

- **Bundles of tissues are organized to form the muscle (ex of organ) that perform a specific function**

  ex:

- The muscle that lies on the front part of upper arm between the elbow and the shoulder

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3- from organ to system

- Each system is a group of organ that perform a specific function for the body

ex : musculoskeletal system

- The musculoskeletal system is formed of two system which are **muscular system and skeletal system that work together to allow the body movement**

- it consists of a group of organs which are :

- **bones**
- **muscles**
- **ligaments**
- **tendons**
- **cartilages**

4- from systems to the whole body

- **human body consist of many systems that work**
- **Together**

ex : when you play football, this requires interaction between the respiratory system , circulatory system , nervous system ,musculoskeletal system and excretory system .

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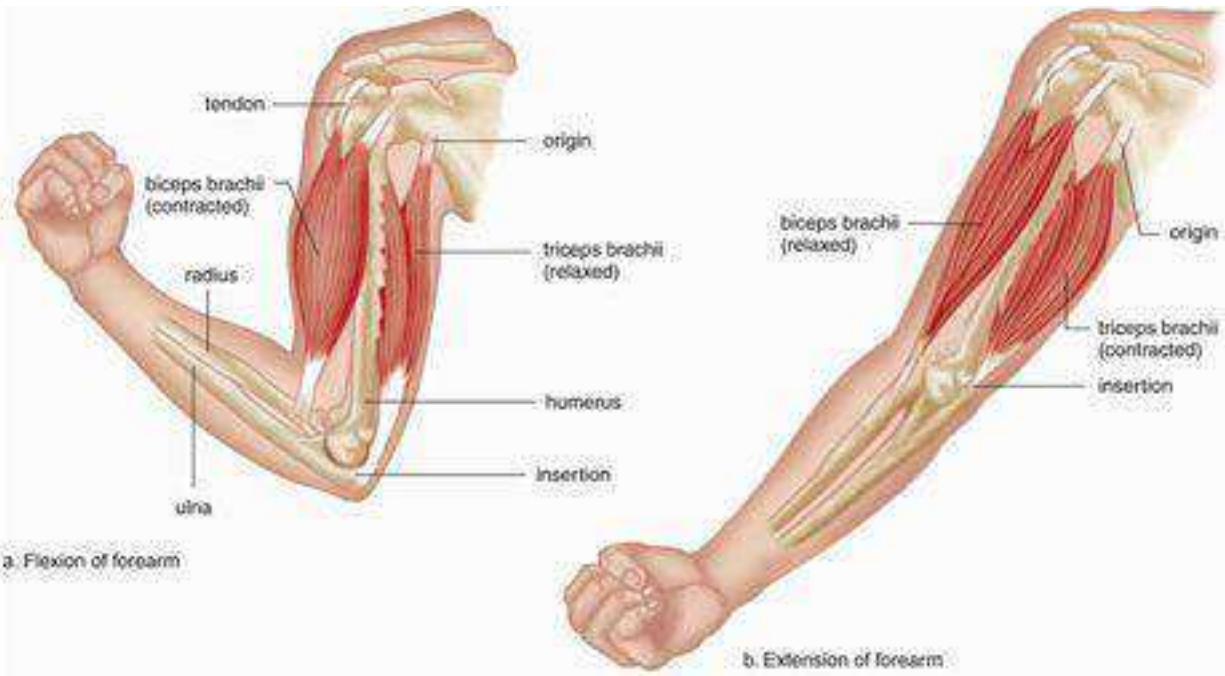
Moving muscles

- your arm moves due to contraction (shorten in length) and relaxation (increase in length) of muscles connected to the bones of the arm , where :

- the forearm moves up towards your shoulder when the muscle in front of the upper arm contracts and the muscle in the back of the upper arm relaxes

- the forearm moves down away from shoulder when the muscle in front of the upper arm relaxes and the muscle in the back of the upper arm contracts



Notes :

✓ the contraction of muscles moves the bones in one direction only

✓ the muscle can only exert force when it contracts

✓

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Class work

- Choose :

- Cells differ from each other in ……..

a- shapes only b- sizes only c- shapes and sizes

2- the muscles is considered as ……

a- a cell b- a tissue c- an organ

3- your leg moves due to contraction and relaxation of …… connected to the bones of leg

a- hairs b- skin c- muscles

4- all the following organs belong to musculoskeletal system , except ……

a- tendons b- bones c- veins

Give reasons for:

- Muscles cell are in the form of long fibers
- ……
-

- Put true or false :

1- A group of different tissues can form a system ( )

2- the muscle cells cannot store and use energy quickly ( )

3- contraction and relaxation of leg muscles allow the bones of leg to move ( )

4- the forearm moves up towards your shoulder when the muscle in front of the upper arm contract ( )

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Home work

- Complete :

1- they body consist of a group of ……which of a group of organs

2- when a muscle contract , it can exert ……..

3- the contraction of muscles moves the bones in ……..only

Give reason :

- Muscles cell don’t work alone
- ……..

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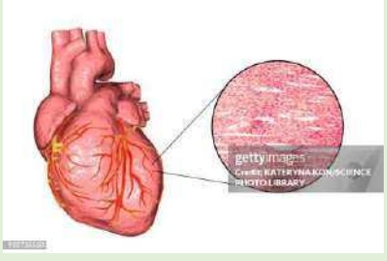
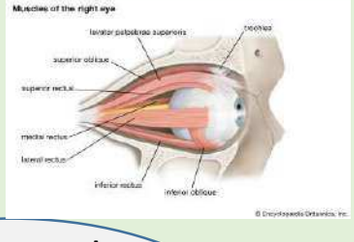
Lesson three :Mighty muscles

- There are two types of muscles :

Types of muscles

Involuntary muscles -	Voluntary muscles
They are muscles that move automatically and you cannot control their movement	They are muscles that you can control their movement
Example : -(heart muscle) or (cardiac muscle) - Heart muscle contracts and relaxes without stopping to allow the heart pumps the blood carrying oxygen to all the body cell - Eye muscles your eyes contain a type of involuntary muscles that contract when you close your eyelid to allow you blink many times in one minute without thinking	Examples : - Upper arm muscles - Neck muscles - (moving your head up `and down)





Note:

Your eyes also contain voluntary muscles that surround the eyeball to help you eyes

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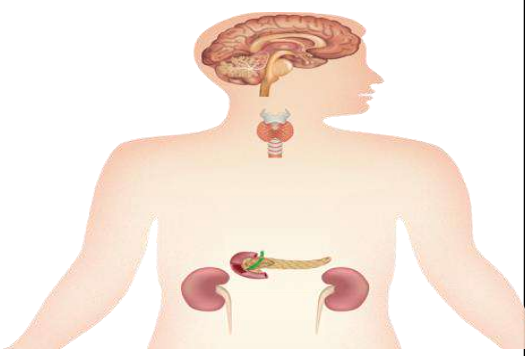
Endocrine system



Its structure :

- it consists of **glands** that secrete **hormone**s that help the body gets ready to respond in different situation

Its function

- It controls the body temperature and the blood pressure

Its role during danger

- when the body faces a danger , it gets ready to fight this danger or run away from it , where
- - the eye see a danger and a signal to the brain , then the brain sends a signal to the body to respond to the danger
- - the endocrine system secretes hormones that control this response and affects other body system to face the dander
- such as :

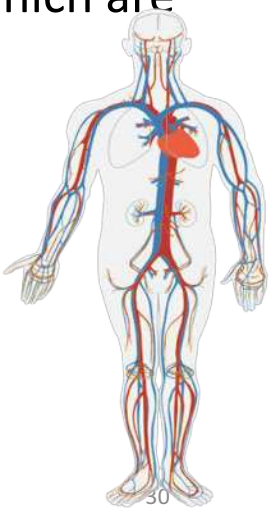
1- contraction of muscles 2-increasing the breathing

3- increasing the heartbeats

Circulatory system

Its structure

- It consists of heart muscle and blood vessels which are (Arteries , veins and Blood capillaries



Its function

It transports blood , gases , nutrients and hormones throughout the body

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Its role during danger

- the heart pumps more blood to the muscles
the blood pressure increases

• Respiratory system

Its structure :

- it consists of
  - lungs - diaphragm
- Airways (such as trachea and bronchi)

Its function

- it provides the body with oxygen gas and gets rid of carbon dioxide

➢ when the body faces a danger , the breathing rate increases and the heartbeats increase

- When the diaphragm muscle contracts , the lungs take in the air rich in oxygen gas	- When the diaphragm muscle relaxes , the lungs release the air rich in carbon dioxide gas

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Class work

- Choose :

- heart muscles …… to pump the blood carrying oxygen to all body cells

a- contract only b- relaxes only c- contracts and relaxes

2- Among the organs which contain both involuntary and voluntary muscle is the ……

a- heart b- arm c- eye

3- the system which helps your body gets ready to respond in different situations by secreting hormones is the …….. System

a- digestive b- endocrine c- circulatory

4- All the following are from types of blood vessels , except …

a- Arteries b- heart c- veins

Scientific term :

1- the system which consists of lungs and other airways

( )

2- the muscles that you can control their movement

( )

What happens to ?

- The human body when the heartbeats increase during danger

- ……

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Home work

- Put true or false :

1- heart muscle is considered as voluntary muscles ( )

2- the heart begins to beat quickly during normal situation ( )

3- blood transports oxygen gas only to all the body organs and tissues ( )

Complete :

- Endocrine system consists of …….which secretes ……that control body temperature and blood …….
- 2- among the skeletal muscles that you can control their movement are upper arm muscles and …….

Give reasons :

- When the body faces a danger , the heartbeats increase ?
- ……

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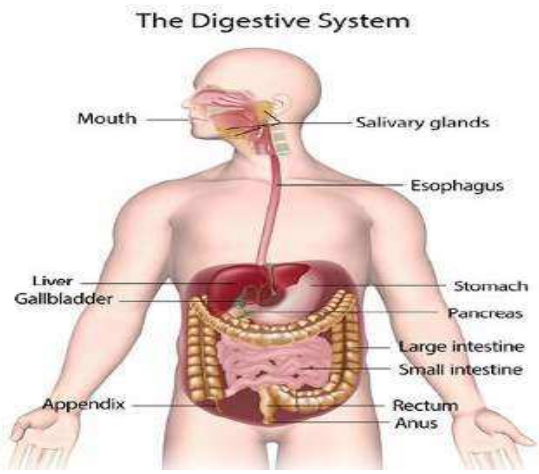
Lesson four :Getting fuel

- You have learned that the body systems work together to keep the body working in a correct way so , these system need energy from the food
- food contain different nutrients such as (carbohydrate , fats and proteins)
- the complex nutrients must be converted into simpler substance before they can be used by body cells

• Digestive system

- the human digestive system converts the complex food into simpler substances that the body can use for energy and growth in a process called " digestion process"
- Food passes through the different parts of the digestive system as follows :



- Digestion process begins when you put food in your mouth , where
-

• 1- Mouse

- jaw muscles move to help your teeth to chew the food
- during the chewing process , salivary glands produce saliva (a liquid in your mouth that contains enzyme) can soften the food and begins the chemical breakdown of food

• 2- Esophagus :

- - After you swallow the food , esophagus 's muscles push the food to stomach

3-Stomach

The stomach leads to more breakdown , due to :
-The continuous churning movement of the stomach
- the secretion of stomach that contain(enzymes and acid)

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4- small intestine :

- When the food moves into the small intestine ,it continues its chemical breakdown by the help of enzymes secreted into the small intestine from pancreas and gallbladder
- Absorption of nutrients takes place through the wall of small intestine to the blood vessels to carry them to all the body parts (end of digestion process)

5- large intestine or (colon) :

- The undigested food is passed to the large intestine as a soupy mixture
- then , it **absorbs most of water** from the undigested food that body as solid mass known as **feces or stool**
- the last part of large intestine is known as **rectum** that stores the feces until it leaves the body
- the stool leaves the body through a muscular opening called **(anus)**

- Transporting nutrients :

Nutrients are transported to different organ through the circulatory system

some nutrients are used at once and other are stored as **sugar and fats** **example:**

The liver and muscles can store glucose sugar and convert it into Glycogen (animal starch)

→

The liver and muscles convert Glycogen into glucose sugar again when the body get energy

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The Excretory system

- Not all the materials we eat are useful . Also , some of the vital process that occur in our bodies produce waste materials so

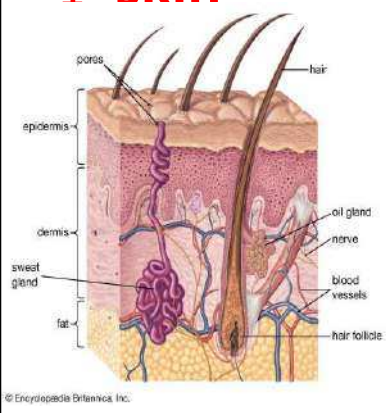
➢ how does the body get rid of these waste materials

- The waste materials leave the body through the excretory system in process called excretion process

- **It is the system that collects waste materials produced from cells and removes these waste materials from the body**
- **The excretion process is necessary to remove waste materials resulting from burning food inside the cells**

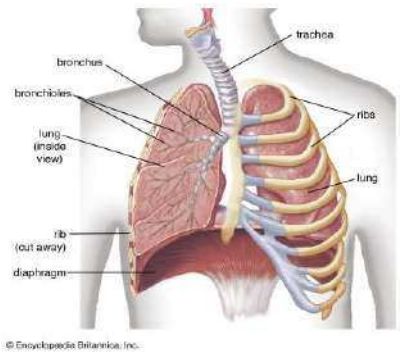
➢ what are the body parts responsible for excretion process?

1- **skin**



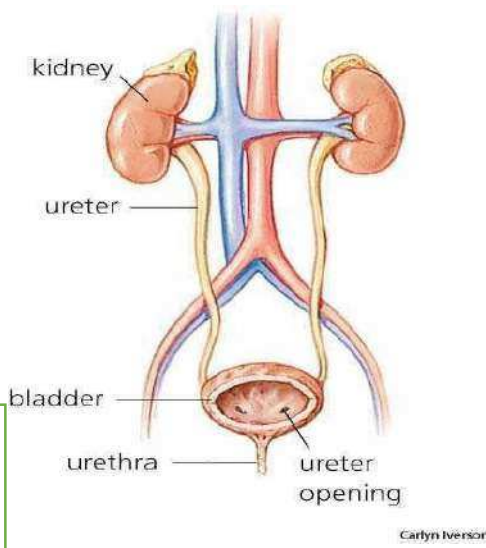
Skin removes sweat through pores

2- Respiratory



Respiratory system removes carbon dioxide through the lungs

3- Urinary system



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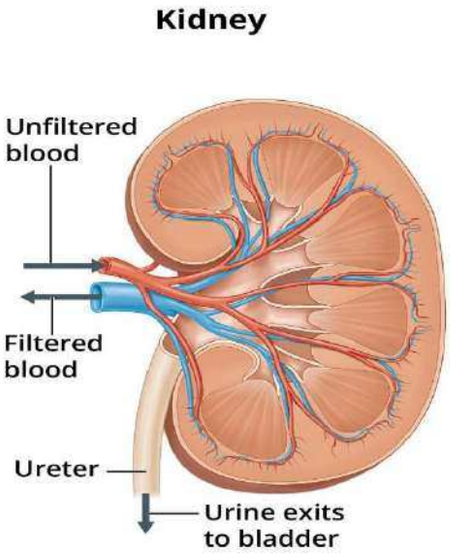
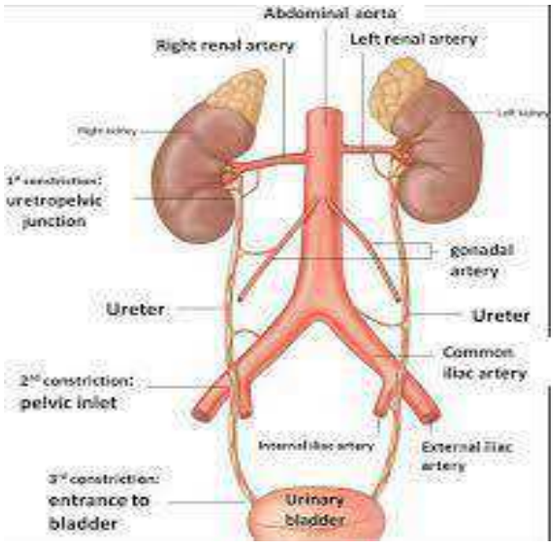
Urinary system





Its function

- It removes waste materials from the blood in the form of urine

Its structure

it consists of :

1- The two kidneys	Two narrow tubes (two slender tubes)	3- the bladder and urethra
• the two kidney contain a very big number of microscopic filter known as nephrons • the two kidneys clean and filter the blood up to **300 times** a day Where : • A large artery brings blood to kidney • after the filtering , urea and other waste materials and water become **urine**	they carry urine from the kidneys to the bladder	the bladder stores the urine , then it is removed from the bladder through tube called the **urethra**

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Nots :

✓ the digestive system **doesn't share** in excretion process due to

- Feces doesn't pass through any membrane to leave the body

-feces is formed due to the undigested food

✓ if your body didn't get rid of waste , you would get stick

✓ one of the most important waste materials removed by kidney is called urea which is formed due to the breakdown of proteins inside the body cells

Lesson six stem

✓Pancreas is one of the organs of endocrine system that produces insulin hormone

✓ insulin hormone regulates the right amount of sugar that the body can use for energy (regulate the sugar level in blood)

✓ if pancreas doesn't make its function correctly , people will infected with diabetes

✓ Diabetes disease

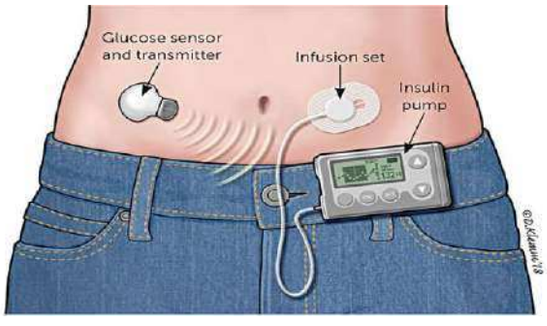
- Is one of the disorders of the endocrine system
- _people with the diabetes disease are unable to make or use insulin so sugar stays in the blood

➢ how to use technology to treat diabete

❑ 1- Diabetics must give themselves regular shots of insulin

❑ insulin pump

Which in a device attached to the body to help diabetics regulate the blood sugar levels with automatic injection of insulin



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Class work lesson 4, 5 and 6

- Choose :

1- the system of the human body get their needed energy from ……..

a- the sun b- water c- food

2- you can use your ……..muscles to help the teeth chew the food

a- eye b- upper arm c- jaw

3- Digestion process starts in your …….

a- mouth b- stomach c- small intestine

4- the organ which belongs to the digestive system and secretes fluids contain and acid and some enzymes is the ……

a- stomach b- small intestine c- mouth

5- the part of large intestine which stores the feces until leaves the body is the ……..

a- rectum b- colon c- anus

6- the body gets rid of waste materials by …….process

a- digestion b- excretion c- sensation

7- the two kidneys play an important role in filtration of …….inside your body

a- water b- acid d- blood

8- urination process happens by the help of the ……..system

a-digestive b- urinary c- respiration

9- insulin hormone is responsible for regulating the level of …..in blood

a- proteins b- fats c- sugar

10 – people who suffer from diabetes can use the insulin pump device that injects the body automatically with ……

a- sugar b- water c- insulin

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Give reasons :

- 1- the two kidney contain many nephrons
- ……
- 2- formation of urea inside the body of human
- ……

What happens :

- Your body doesn't get rid of waste materials
- ……

- Scientific term :

- a substance that is stored in liver and muscles , then converted into glucose when your body needs energy
- ( )
- 2- a liquid in your mouth contains an enzyme which helps in digestion ( )

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Home work

- Put true or false :

1- people whose kidneys are not working properly must use other devices to filter their blood from waste ( )

2- the insulin pump device helps diabetics regulate the water level in the blood ( )

3- studying a kidney model can save money and effort ( )

Give reasons :

- Undigested food becomes soiled wastes inside the large intestine .
- …….

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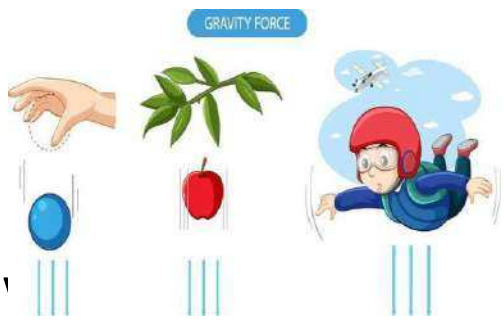
Concept three: Energy as a system lesson one :Electric circuits

- **Electrical poles** that support electric wires between cities and the wires inside walls are all example of what is known as " electric circuits "
- SO, every time you turn on a light switch or an electrical device , you use electric circuits

• Lesson two : Magnetism and Gravity

Gravity



- It is a force that affects everything
- There are two factors that affect the force of gravity :

Distance	mass
If the distance between objects increase the gravitational force will decrease	If the mass of objects increase the gravitational force will increase

- we cannot the gravity ,but we can observe its effect on object such as : - when you throw a ball into the air, it will fall back to earth

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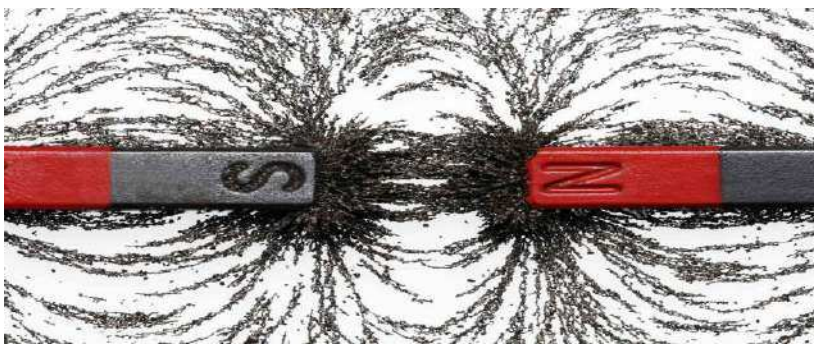
Magnetism

- Magnets are made of **iron and other materials**
- A magnet has a force called " magnetism "
- magnetism allows magnet to attract or repel other magnet



- Magnetism of a magnet appears in an area around it as

"magnetic field "

- like gravity , we cannot see the magnetic field , but we can only observe its effect , as follows :

- The best way to see the magnetic field is to allow a magnet attract some **iron filings**
- the pattern that the iron filing make near the magnet is the out line of its magnetic field as shown in the opposite picture
- some materials are attracted to the magnet and called magnetic materials such as iron (steel), nickel and cobalt

while other materials are not attracted to the magnet are called non- magnetic materials such as Aluminum , plastic and wood

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Class work

- Choose :

1- when you throw a ball upward , it returns back the ground due to ……..

a- gravity b- magnetism c- mass

2- magnet can be made of ……

a- copper b- glass c- iron

3- the ….. Of an object and its …… From the earth's surface , affect the gravity force

a- mass and color b- distance and mass

c- shape and distance

4- All the following materials are called magnetic materials , except ……

a- iron b- plastic c- steel

Scientific term :

1- the materials that are not attracted to the magnet ( )

2- the area around the magnet in which its magnetic force appears ( )

3- the force that allows the magnet to attract some materials without making direct contact ( )

Give reason :

- The electric circuit is considered as a system

- ……

- What happens if :

- The mass of an object increases . (according to the gravity)

- ……

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Home work

- Complete :

1- to see the magnetic field of a magnet , we should use ……filings

2- magnetism is an attraction or …….force , while gravity is ……..force only

3- gravity attracts any object that has ……

Put true false :

1- All materials can be attracted to the magnet ( )

2- magnet are made of some metals like iron ( )

3- Due to the great mass of earth , it attracts all objects towards its center ( )

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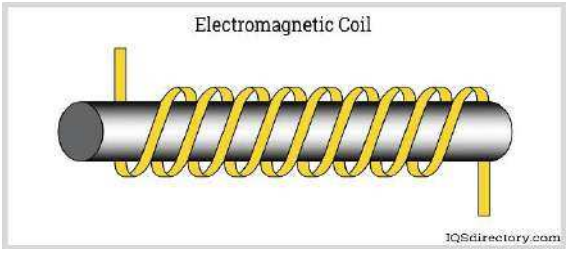
Lesson three : Generating Electricity

- in this activity , we will study the generator which is a device used in generating electricity .

Generator



- structure : it consists of : - large magnets - coiled wires
- function : it changes mechanical (Kinetic) energy into electrical energy used in lighting houses and operating electrical devices
- How does a generator work ?

when large magnet spin at a high speed , the spinning magnet generate electrical charges on the coiled wires , so electricity is produced

There are different forces that can be used to make the magnets in the generator spin to generate electricity , such as

- Water In dams are used to operate water turbine
- winds are used to operate wind turbines
- sources of fuel such as (oil and coal) are used to make water boi

Producing steam

Causing the magnets in the generator to spin

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- You already know some information about electricity and magnetism

the flow of electricity through wires is known as **"electric current "**

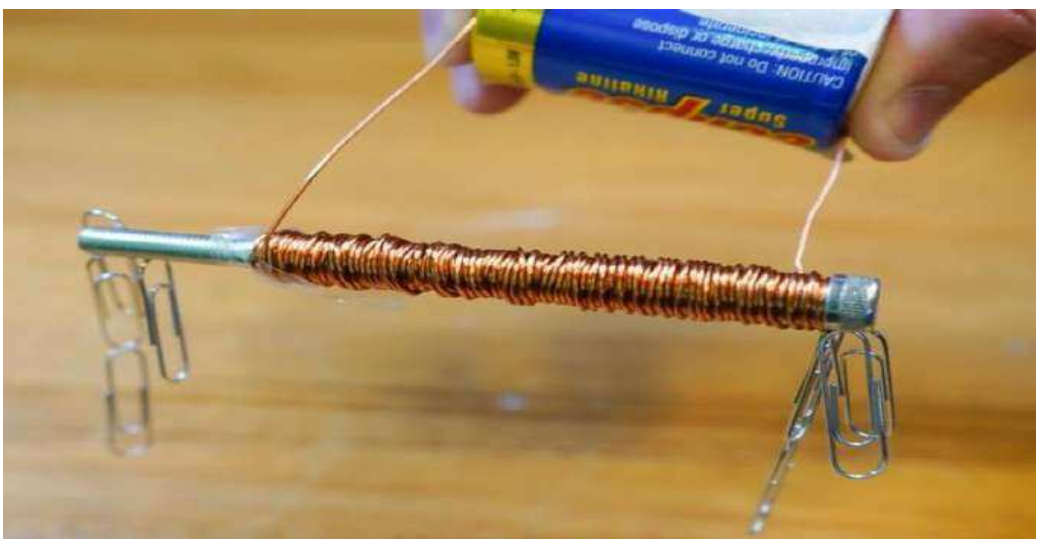
Electric current

It is the flow of electric charges along a closed path

the electric current comes from the movement of tiny charged particles through conducting wires

When an electric current flows through a wire , it forms a magnetic effect around the wire known as "magnetic field

if a wire wrapped around a metal core , the magnetic field produced by the flowing current is strengthened , so the metal core attracts the iron nails as in the opposite picture .



we can conclude that : Electricity and magnetism can work together

Component of a circuit

You have learned that magnets , generators and turbines can be used to generate electricity

Electricity :

It is a form of energy that comes a flow of electric charges (electrons)moving along an electric conductor

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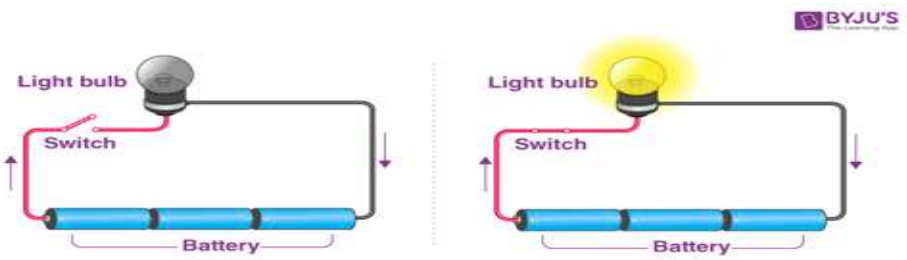
Electric circuit :
It is a path for transmitting an electric current

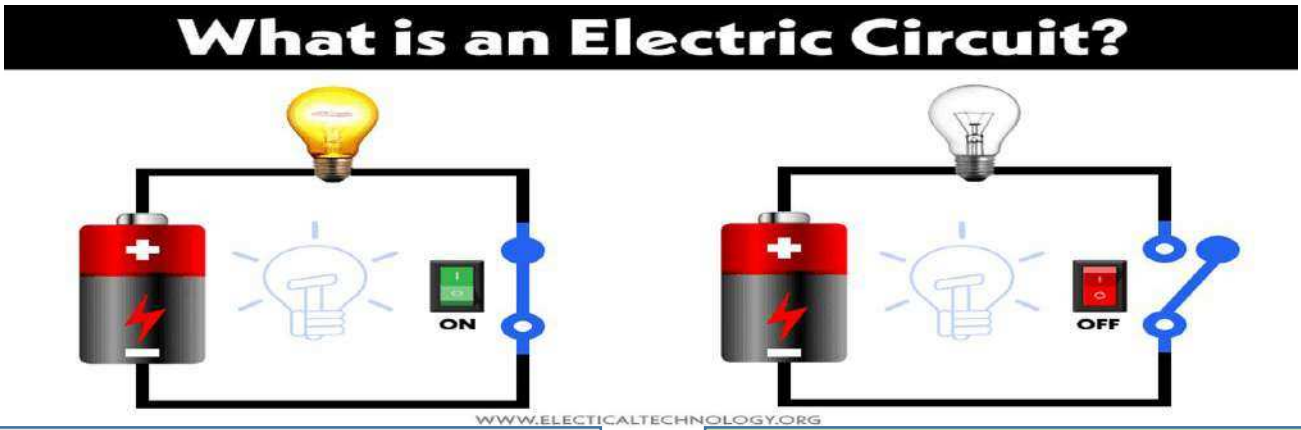
- To make the electric current flow through an electric circuit
  1- the circuit (loop) must be closed
  2- the circuit (loop) mast have a source of electricity



Parts of electric circuit :

- A metal wire
- An electric power source (such as : battery)
- An electric device (such as light bulb)
- A switch

* A switch is the most common tool to open and close the electric circuit as follows :



When the switch is closed (turn on) , it closes the circuit , so the electric current flows

When the switch is opened (turn off) , it opens the circuit ,so the electric current doesn't flow

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Electric conductors and insulators :

Electric conductor (good conductors)	Electric insulator(bad conductors)
They are materials through which electric current (electrons) flows easily	They are materials through which electric current (electrons) does not flow easily
Example : - ALL metals such as : iron , copper and Aluminum water	Example : - Rubber - Plastic .

Current safety :

- most electric wires are coated with rubber or plastic which are bad conductor of electricity , to protect people from electric shock

- Touching non- insulated wire that an electric current flow through causes an **electric shock** and may cause death , because the human body contains a lot of water which a good conductor of electricity

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Class work

- Complete :

1- the generator consists of a large ……and …….

2- the electric current can transmit in closed path called an ……

3- the electric current causes …… in the human body as it contains that is a good conductor of electricity

4- components of the electric circuit include switch , an electric power source and …….

Give reasons :

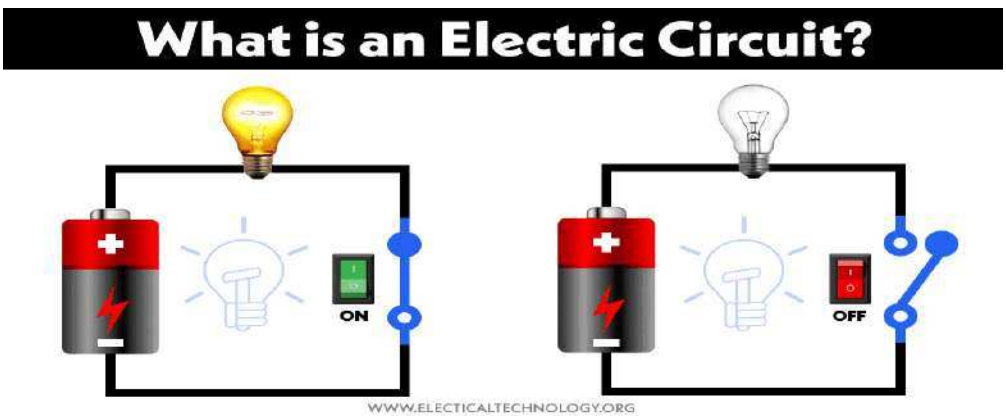
1- Electric generators have great importance in our life

……

What happens :

- The switch is turned on in the electric circuit
- ……

- Mention the components of electric circuit :



- 1- …… 2- …… 3- …
- 4- …….

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Home work

- **Mention some materials**

- good conductor

- - …….. - …….. -
  -

- bad conductor (electric insulators)

- ……. - …… - ……..

- Give reasons :

- Most electric wires are covered with rubber or plastic

- ……

- Choose :

- 1- wind turbines need…… ……. To produce electricity

- a- water force b- generators c- gravity

- 2- the source of electricity in a electric circuit is a ……

a- battery b- switch c- heater

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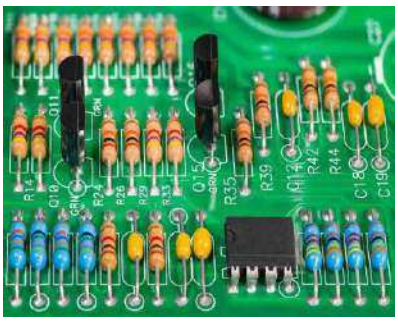
Lesson four: importance of electric insulators:

Electric insulators stop the flow of electricity , so they keep you safe from getting shocked by the electric current

• Electric resistors :

- they are components of an electric circuit limit the flow of electric current .



-The importance of electric resistors:

❑ electric resistors are used to **slow**

The flow of electric circuit to avoid

The damage of the other components of an electric circuit

❑ **electric resistors can be found in some devices such as:**

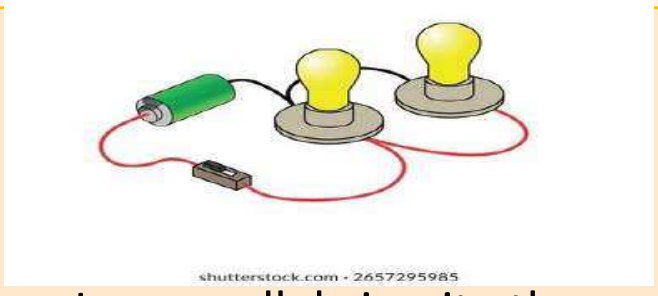
- **toaster** - **Microwave** - **Electric stove**

Electric circuits : series versus parallel circuit

series circuit

- In a series circuit , all the component of the circuit including the light bulbs are connected in a single loop
- The electric current can flow along one path only from the energy source through the circuit

Parallel circuit



- In a parallel circuit , the light bulbs are connected in two or more different branches of the circuit
- the electric current can flow along more than one path from the energy source through the circuit

If one light bulb blows out

- The other light bulb will Turn off in the Series circuit

The other light bulbs will remain lit in the parallel circuit

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- Advantage of using parallel circuit

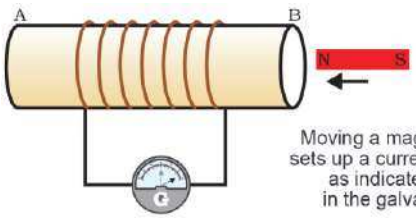
- Parallel circuits are found in houses , so , if we turn off one of home's devices . The other will continue to work

-Galvanometer

-it is a device used to detect the flow of small electric currents

Example:

If we bring a tightly coiled a wire around a hollow cylinder and we connect this coil to a galvanometer as shown in the figure.



Moving a magnet towards a coil sets up a current in the coil circuit, as indicated by deflection in the galvanometer needle

❑ **when the magnet was placed at rest away from the coil :**

- the needle of galvanometer did not move (no electric current flow)

❑ **when the magnet was moved toward and into the coil :**

- the needle of the galvanometer moved to one side (electric current flow)

❑ **when the magnet was moved rapidly back and forth inside the coil** :

- the needle of the galvanometer also moved rapidly to both sides (electric current increases)

❑ **when the number of loops in coil increases**

- the movement of needle of the galvanometer will increase (electric current increases)

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From the previous experiment , we can conclude that :

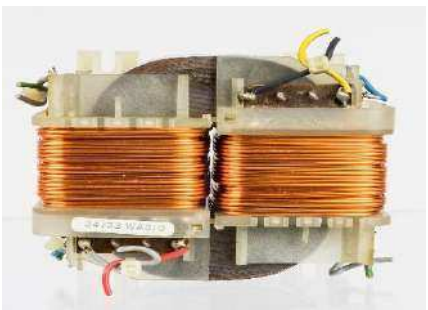
- There are two factors that causes the increase of the amount of generated electric current which are :

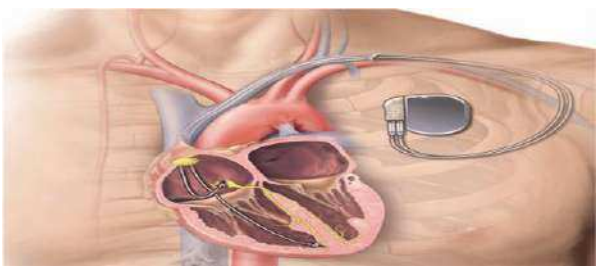
✓ Increasing the speed of the magnet movement

✓Increasing the number of loop in the coil

- the relation between the magnetism and electricity is used in :

- Electric motor - Electric generator - Electric transformer





Artificial pacemaker :

- It is a device that operates with a battery and inserted into the chest to simulate the heart muscle to beat at regular intervals .

its function :

- It help the heart muscle to beat at regular intervals for patients who have a slow or irregular heartbeats

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Class work lessons 4,5and 6

- Choose :

1- All the following materials are electric insulators except ,….

a- rubber b- plastic c- steel

2- ……..is used to slow the follow of an electric current can flow through different branches

a- A battery b-A switch c- A resistor

3- in the ……..circuit , the light bulbs that are connected in one loop will light up

a -open parallel b- closed parallel c- closed series

4- the ……. Is a muscle that beats inside the human body to push the blood to all body parts

a- stomach b- brain c- heart

5- the artificial pacemaker is inserted into the ……of human body

a- brain b- chest c- hands

Give reasons :

1- electric wires are made of cooper

……

2- some electric circuits contain electric resistors

……

What happens if

- A patient has a slow or irregular heartbeats
- ……
  ……

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Home work

- Scientific term :

1- A device inserted into the chest to stimulate the heart to beat regularly ( )

2- one of the components of an electric circuit that is used to limit the flow of electricity through the circuit ( )

Give reason :

- In the parallel circuit , we can turn off or remove on light bulb while the other light bulb will remain lit .
- ……

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Unit two : Getting energy

concept one : Thermal energy and states of matter

- you already know that :

  - Every thing around us is made of matter.

  - matter can change from one state to another such as :

Glassblowing

- manufacturing of glass depends on changing the glass from one state to another
- Glassblowing is a process to form different shapes of glassware by using a hallow tube contains molten glass at one end of its ends , where :

1- when the glass (solid matter) is heated at very high temperatures , it changes into molten glass (liquid state)

2- the molten glass could be blown by a person from the open end of the hollow tube and he could make different shapes of molten glass

- 3- then, the molten glass is cooled forming different shapes of glassware.

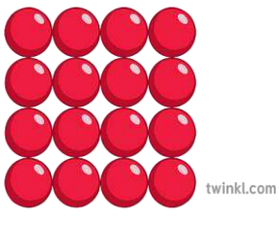
- All matter is made of particles called **atoms** and **molecules**

Atom :

It is the smallest building unit of matter

Molecules :

It is a group of atoms bound together



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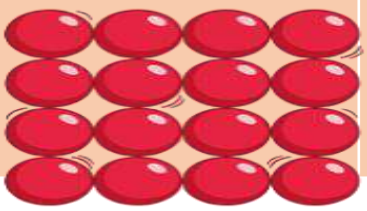
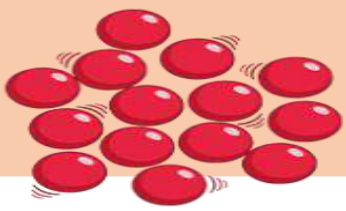
The following table show some properties of different states of matter

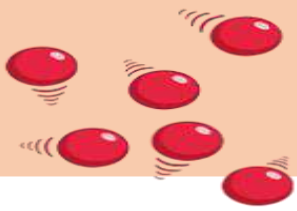
solid	Liquid	Gases
Shape and volume		
they are substances that have fixed shape and fixed volume	• they are substances that have fixed volume	• They are substances that have variable shape and variable volume
Molecules		
• their molecules are held together tightly in their position • their molecules vibrate around their places	• their molecules are held together more than molecules of solid • their molecules moves faster than solid and can slide over each other	• their molecules are not held to ether • their molecules move independently in all direction
Thermal energy • **all matter in different states contain thermal energy that (depend on the movement of particles)**		
• Particles of solid matter have a least thermal energy (move slowly)	• particles of liquid matter have moderate thermal energy	• particles of gas have the most thermal energy



Solid



Liquid



Gaseous

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Class work

- Choose :

1- the molecules is composed of very small particles called …

a- cells b- atoms c- mixtures

2- the …….. Energy is related to the motion of particles of a matter

a- chemical b- potential c- thermal

3- on boiling water inside a kettle ,……

a- water particles will move faster

b- thermal energy of water will decrease

c- water particles will move slower

Scientific term :

- It is thermal smallest building unit of matter ( )
- it is a group of atoms bound together ( )
- the state of matter that has fixed volume and shape ( )

- Home work

- What happens to …?
- the state of glass when it is heated at very high temperatures
- ……

- Mention some examples of :
- Solid matter
- ……,……and ……..
- Gas matter
- ……,…… and ……..

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Lesson two : Thermal energy , heat transfer and temperature

1- Thermal energy

✓ molecules and atoms of substance have Kinetic energy due to their motion

✓Thermal energy of a substance relates to kinetic energy of its molecules and atoms

Thermal energy
It is the total sum of the kinetic energy of its molecules and atoms

2- Transfer of thermal energy

❑ thermal energy (heat) transfers from one substance to another **if they have different temperature** , where :

Heat flows from a hotter substance to a colder substance .

❑ Example:

- when you hold ice cubes , your hand feels cold **G. R**

Because thermal energy transfers from your hand (hotter) to ice cubes (colder)

- when a substance is heated :

- thermal energy is transferred to the molecules of the substance
- the molecules gain thermal energy and move faster
- this causes :
  - the kinetic energy and temperature of substance increase

Temperature
It is a measuring of average kinetic energy of molecules and atoms of a substances

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Change of state of matter

- `you have learned that when the thermal energy of a matter increase , the kinetic energy of molecules increases and they move with faster speed , this leads to increasing the temperature of a matter .

➢ the following table shows the change from solid state to liquid and the opposite change

change solid to liquid (Melting)	Change from liquid to solid (freezing)
(melting) It is change state of matter from solid state to liquid state **On heating a solid matter :** - the thermal energy of molecules of solid matter **increases** - The force that holds these molecules together decreases so , they vibrate faster - - Example : ice changes to water	**(freezing)** It is the change of state of matter from liquid state to solid state **On cooling a liquid matter:** - the thermal energy of molecules of liquid matter decreases - the force that holds these molecules together increase so , they vibrate slower Example : - water changes to ice

Melting point

It is the temperature at which a matter changes from solid state to liquid state

➢ ex

- ice a melting point of zero degree (0 c)

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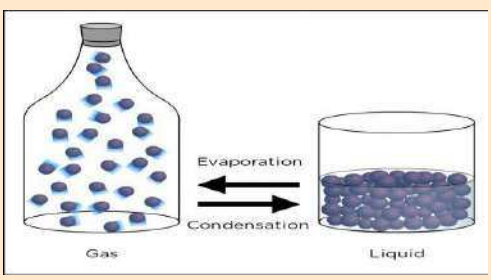
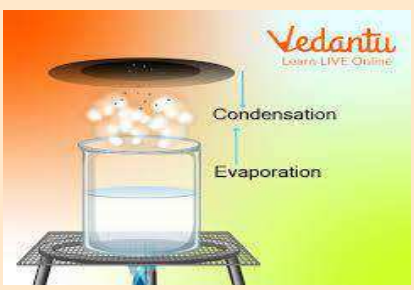
Change from liquid to gas state (Evaporation)	change from gas to liquid state (CONDENSATION)
(Evaporation) It is the change of state of matter from liquid state to gas state **on heating a liquid matter** - The thermal energy of molecules of liquid matter increase - the force that holds theses molecules together decrease so , they vibrate more faster - Example : - water changes to water vapor 	(Condensation) It is the change of state of matter from gas to liquid state **on cooling a gas matter** - thermal energy of molecules of gas matter decrease - the force that holds theses molecules together increase so , they vibrate slower Example : - water vapor changes to water 

Activity
Temperature and particles movement (lesson 3)

Boiling point
It is the temperature at which a matter changes from liquid state to gas state

Ex:

- Water has a boiling point of 100 C
- Mercury has a boiling point of 357 C

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Class work

- Complete :

1- thermal energy of a substance is the sum of …….energy of its molecules and atoms

2- thermal energy transfers from one substance another if they have ……temperature

3- the process in which liquid changes into solid is called ……process , and the reverse process is called ……process .

What happens if ?

- You heat a piece of butter
- ……

- Home work

(A) process	(B) matter changes
1- melting 2- Evaporation 3- freezing 4- condensation	a- from liquid to gas b- from solid to liquid c- from solid to gas d- from gas to liquid e- from liquid to solid

1- 2- 3- 4-

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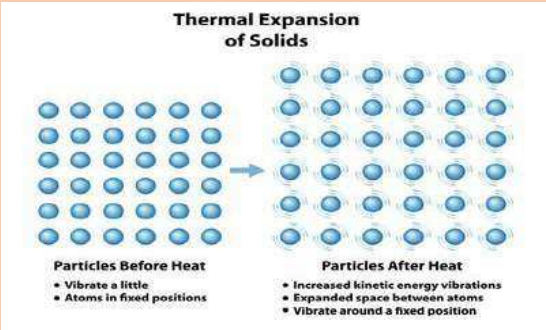
Lesson four :
Thermal expansion

❑ you have learned that matter behave differently when are heated or cooled , where :

heating	Cooling
• when we heat a matter , the spaces between its molecules **increase** • so , the molecules spread out and the matter expand • The volume of matter **increase** . - this is called " expansion "	• when we cool a matter , the spaces between its molecules **decrease** • so , so the molecules come close together and the matter contracts • so , the volume of the matter **decreases** - this is called "contraction

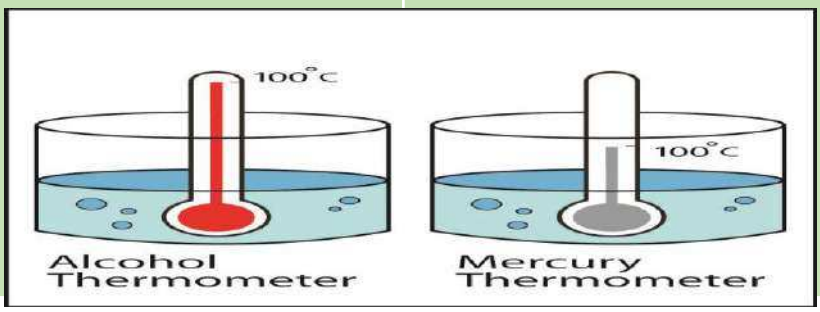

Thermal Expansion of Solids
Particles Before Heat
• Vibrate a little
• Atoms in fixed positions
Particles After Heat
• Increased kinetic energy vibrations
• Expanded space between atoms
• Vibrate around a fixed position

❑: Now , let's study some example of contraction and expansion of some matter

Examples
1)Thermometer

❑ some thermometer contain alcohol (liquid) mixed with color where

when the thermometer is placed in a hot substance	**When the thermometer is placed in a cold substance**
The temperature of alcohol ⟹ increase The spaces between its molecules ⟹ increase So , the alcohol expands	the temperature ⟹ decrease The spaces ⟹ decrease So , the alcohol contracts



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2- jars :

- sometimes it is hard to open the lid of the jar that made of metal
- when hot water is poured on the metal lid , the temperature of the metal lid increases and the spaces between its molecules increase so the lid expands

3- Bridges

- bridges are made up of steel (metal) and concrete
- during hot weather, the temperature of metal increase and spaces between its molecules increases so the metal expands
- so , engineers use expansion joints to keep bridges safe from bucking (bending) when they expand at high temperature

4- In railroad tracks

- railroad tracks are of iron
- Engineers leave small spaces between the railroad tracks to expand in hot weather without being bent to avoid train accidents .

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Class work 4, 5

- Choose :

1- As a result of heat flow through melts , they …….

a- expand b- contract c- get smaller

2-By decreasing the temperature of a substance , its molecules move……. Each other and the spaces between them ……

a- farther from – increase

b- father from – decrease

c- closer to -decrease

3- railroad tracks are made up of ……

a- glass b- coal c- iron

4- when the kinetic energy of liquids decreases , they may ….

a- expand b- contract c- evaporate

Give reasons :

- Engineers use expansion joints in the design of bridges
- ……..
- The size of a balloon decreases if it is subjected to cold weather
- ……

- What happens if :

- the railroad tracks if no spaces are left between them

……

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Home work

- Put true or false :

1- when a liquid is cooled , it may change into gas ( )

2- expansion occurs when we heat a matter ( )

3- no spaces are left between railroad tracks ( )

4- Engineers use expansion joints to keep bridges safe ( )

What happens to :

- The volume of matter when it is cooled
- ……

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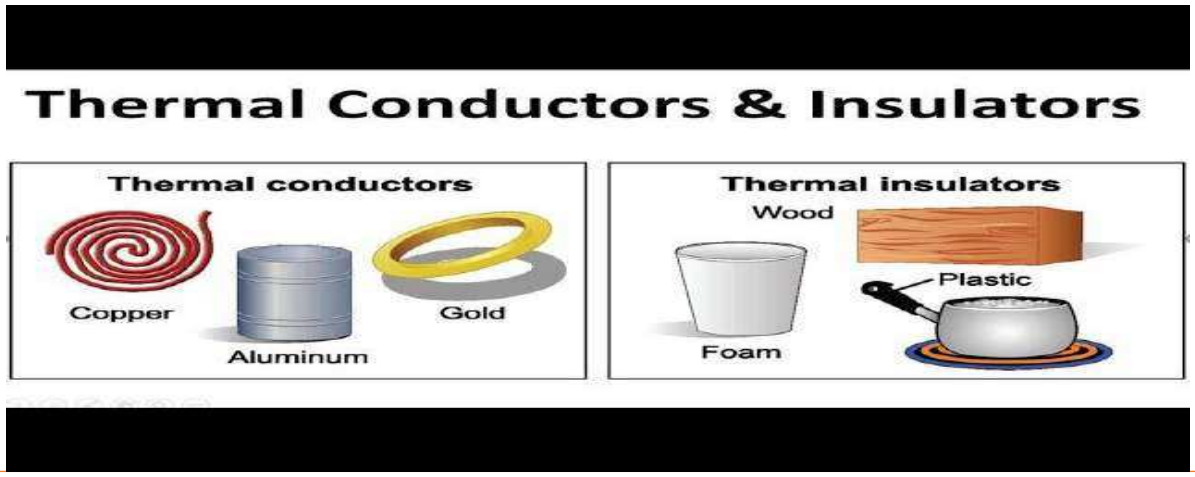
Concept two :heat transfer
lesson one

- you have learned that thermal energy transfers when two materials with different temperatures touch each other .
- the thermal energy transfers from the object with higher temperature to lower temperature .
- there are two types of materials according to their ability to transfer thermal energy which are thermal insulators and thermal conductors .

Thermal conductors (Good conductors of heat)	thermal insulators (Bad conductors of heat)
- they are materials that allow thermal energy to transfer through	they are materials that resist the transfer of thermal energy
Example : Metals (iron	- example : plastic , wood and glass



Note:

- Heat is an essential component of life on Earth

- Heat cannot be lost but it is only transfer

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Class work

- Put true or false :

1- the handle of an electric iron is made of metal ( )

2- heat is types of matter ( )

3- molecules of cold or hot substances always move ( )

4- heat transfer from cooler object to the hotter object ( )

Give reasons :

- The handle of an electric iron is made of plastic
- ……
- You feel heat when you touch a metal spoon placed in a hot cup of a tea
- ……

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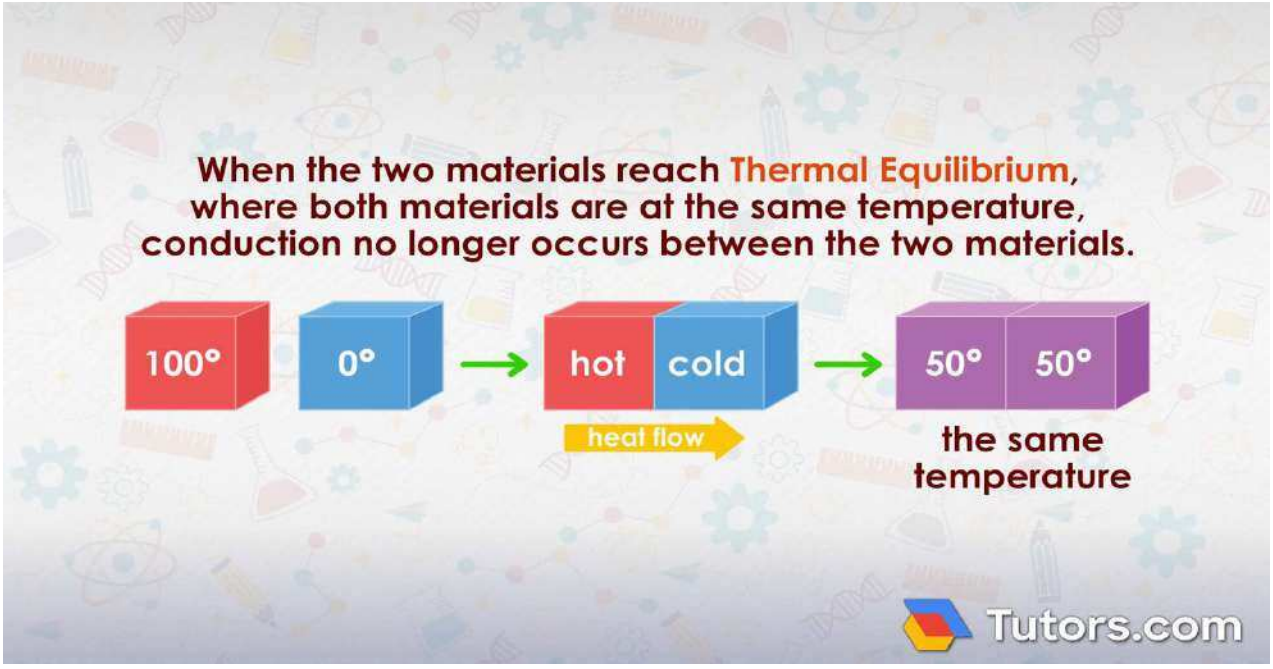
Lesson two

- You have learned that all materials around us are composed of molecules and atoms that vibrate all the time .
- when a matter becomes warmer , the kinetic energy of its molecules **increase** , and when that happens , the molecules vibrate faster
- matter gets warmer by transferring of thermal energy from hotter matter to cooler matter **until thermal equilibrium happens and they reach the same temperature**



Notes :

1- the measuring unit of heat is called calorie

2- if you hit a piece of metal several times by a hammer the piece of metal becomes warm

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Lesson three : Conduction , Convection and Radiation

- **How is heat transferred ?**

heat can transfer by three different ways , which are :

- **Conduction** | Convection | **Radiation**

1- conduction :

- heat is transferred by conduction when objects **with different temperature touch each other**

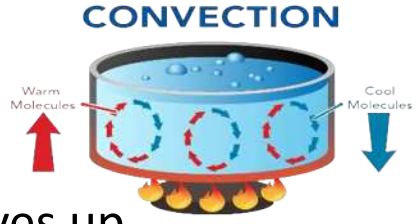
- heat is transferred by conduction in solids only

example :

- when you have a fever and your temperature is high , you put cooling pads to transfer the heat from your body to the cooling pads by direct contact

2- convection :

- Heat is transferred by convection due to the movement of a liquid or gas



- example :
  - During heating water
- Hot water at the bottom of the pot moves up
- cold water at the surface of the pot moves down
- the continuous movement of water up and down causes the transfer of heat through water by a way known as convection

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• 3- Radiation :

- heat is transferred by radiation through **gases and spaces**

- example:

- When your hand gets close to a fire , you feel warm because the air between fire and your hand allows the thermal energy of the fire to transfer to your hand
- in sunny days , we feel the heat of the sun although there is a spaces between the sun and the earth
- **the speed of heat transfer between objects increase when ….**
- the difference in temperature between objects increases
- surfaces area of objects increases
- time of contact between objects increases
- **Notes :**
- 1- meteorologists (scientists who study weather)must understand convection and radiation to help them predict the weather .
- 2- engineers must understand conduction , convection and radiation to design new products such as tools of cooking and also design sidewalks that are cooler and shadier

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Class work

- Choose :

1- heat is transferred through solid by ……

a-Radiation c- convection b- conduction

2- meteorologists are scientists who study …….

a- weather b- rocks c- cell

3- heat can transferred from an electric heater to your body ……when you touch it

a- radiation b- conduction c- convection and conduction

4- all the following materials are considered thermal conductors , except ……

a- copper b- iron c- wood

Scientific term :

1- the way by which the heat is transferred through solids only

(

2- the way by which the heat is transferred through liquids and gases

( )

3- the way by which the heat is transferred through gases and spaces

( )

Give reasons :

- Glass and wood are bad conductor of heat
- ……

- Home work

- Complete :
- 1- plastic is a ……conductor of heat
- 2- cooper is a ……conductor of heat

- Cross out the odd word :
- Conduction - convection - friction - radiation ( )
- plastic – copper - wood - glass ( )

- What happens :
- You touch a hot metal spoon placed in a hot cup of tea
- ……

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Lesson four

- you have learned that materials are classified according to the rate of transferring heat into

Thermal conductors	**Thermal insulators**
(good conductor)	(bad conductor)
Ex :	Ex :
- Iron , copper and aluminum	Air , plastic and wood

Note:

- ❑ thermal insulators cannot prevent the transfer of heat completely , but the slow down the heat transfer through them example : 1-

The metal cup become hot	The plastic cup becomes just warm

2- if you touch a metal doorknob , you may feel that it is cooler than the wooden door it is on , because your body always generates thermal energy

3- thermos is used to keep the temperature of drinks inside it

- it is made up of heat insulating materials

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Heat transfer in the different materials

- When observing cooking pots , you will notice that :

- cooking pots are made of thermal conductor materials such as metal
- the handles of cooking pots are made of thermal insulators materials such as wood or plastic **(to product us from heat**)

➢ there are two factors that affect the thermal insulation of the handles of cooking pots , which are :

1- Types of materials

➢The plastic handle is better than wooden handle

2-length of handle

The handle is warmer closer to the pan , and it is cooler as we go far away from the pan

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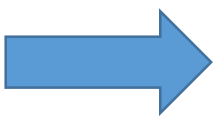
Heat and conservation of mass

- when any matter changes from one state to another by gaining or losing of thermal energy , its mass does not change and this is called **the law of conservation of mass**

Law of conservation of mass

- The mass of a substance does not change from one state into another

example :



20 g

20g

- There are some causes that the mass of a substance before the change does not equal the mass of the same substance after the change . That is because the substance is mixed with other substance .

- Example :

- if you have 100 g of popcorn

Grains when they are cooked ,

They become 97 g due to the evaporation of water during cooking

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Class work lesson 4

- Choose

1- when you put a plastic cup of water in a freezer , the water freezes and its mass …….

a- decreases b- increases c- doesn't change

2- ……is the best materials to make handles of cooking pots , as doesn't warm fast

a- iron b- plastic c- wood

3- when you melt 100 g of chocolate bar , its mass after melting is almost …….100 g

a- a lot less than b- a lot more than c- equal to

What happens to ….?

- The mass of an amount of juice after freezing it
- ……

- Home work

What is meant by :

- Law of conversation of mass
- ……
  ……
  .

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Lesson five

- You have learned that energy can change from one form to another .
- In some cases , when energy changes from one form to another , due to the movement of an objects , some of this energy is wasted in the form of thermal energy .
- **Example :**

- When the bicycle go down a slide , its potential energy changes to kinetic energy
- some of the kinetic energy to thermal energy due to the friction

• Class work

• Choose :

1- when an object stops on the top of a ramp , it stores …….energy

a- kinetic b- light c- potential

2-- when a marble goes down on a ramp , its stored potential energy ……

a- increase - b- doesn't change c- changes into kinetic energy

What happens to ?

- The speed of a moving object when it is affected by friction
- ……

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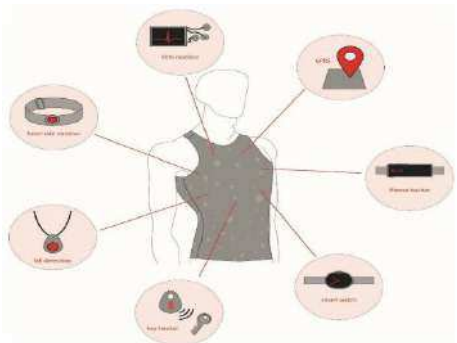
Lesson six : properties of new materials

- People need different materials for different purposes
- Every materials is useful for purposes not for all purposes , so scientists and engineers try to choose the most useful and suitable materials
- Example :

❑ scientists develop a smart materials which is a flexible fabric that keep the temperature of the body

❑ these smart materials are used in making smart clothes that can :

- control your body temperature
-light up in the dark
- keep themselves clean



➢ how are new materials created

A) by mixing different materials together

Ex : - steel (mixture of iron and other element)

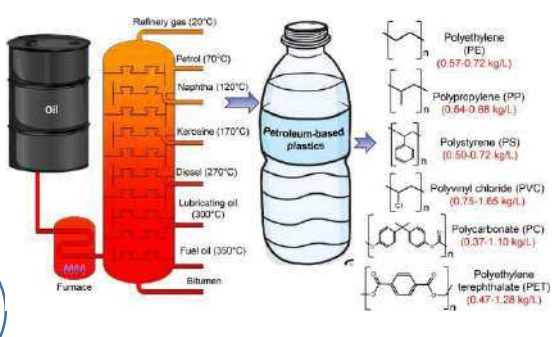
- it is strong and lasts for a long time

- concrete : (mixture of rock , sand and water)

- It is a liquid until it dries , it becomes hard
- it is used as the base of building and bridges because it is very strong

B) By chemical changes :

ex : plastic (is made by chemical change of some of the compounds in petroleum



Petroleum
- Liquid - Burns
- Plastic
Solid – often resists burning

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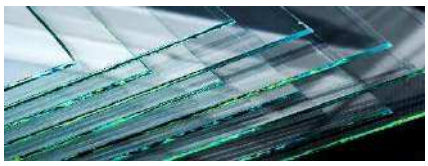
C) By gaining heat (the new materials by mixing materials at high temperature

- Examples :
- 1- shrink wrap

it is created when we add heat to plastic to make it shrink

2- Glass



- Mixture of sand with small amount of other materials such as (limestone and soda as (sodium carbonate)) in hot furnace

- Class work

- Complete :

- 1 Glass is a mixture of ……., ……
- 2- smart clothes can ……in the dark and keep themselves …….
- 3- concrete is in …… State when it is formed , while after it dries ,purpose it becomes in ……state

- Put true or false :

- 1- every material are useful for all ( )
- 2- we can make a car by using cloth ( )
- 3- steel is made by chemical changes of plastic ( )

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1 Cairo Governorate — Eastern Nasr City Educational Zone

1 (A) Put (✓) or (✗) :

1. Tissue is a group of similar cells have the same function. ( )
2. As thermal energy of the body increases, kinetic energy of its particles increases. ( )
3. Animal cell is surrounded by a cell wall to protect it. ( )

(B) Give reasons for :

1. We can't control the movement of heart muscle.

.....

2. Iron is a magnetic material.

.....

2 (A) Cross the odd word :

Battery – Switch – Paper – Lamp – Wire. (.....)

(B) Complete the following sentences :

1. ..... is used to measure temperature.
2. ..... is the building unit of living organisms.
3. Endocrine glands secrete .....
4. Electric circuits in houses are connected in ..... way.

3 (A) Choose the correct answer :

Body gets rid of urine through the ..... system.

a. digestive b. nervous c. urinary d. circulatory

(B) Write the scientific term :

1. A tool which is used to open and close the electric circuit. (.....)
2. The part of the cell that controls cell division. (.....)
3. The increase in the size of a substance due to increasing its temperature. (.....)
4. A system that transports the digested food and oxygen to all body cells. (.....)

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2 Cairo Governorate — Central Cairo Educational Zone

1 (A) Choose the correct answer :

1. A component of the cell that can store nutrients, water, and waste is known as .....

   a. vacuole. b. cytoplasm. c. mitochondria.

2. All of the following are voluntary muscles in the human body, except .....

   a. arm muscles. b. neck muscles. c. heart muscle.

3. The ..... is the energy source in an electrical circuit.

   a. wire b. battery c. switch

(B) What happens if ...?

There is no gaps between railway tracks.

.....

2 (A) Put (✓) or (X) :

Bacteria are multicellular organisms. ( )

(B) Answer the following questions :

1. Why is the kidney considered the main organ in the urinary system ?

.....

2. When you touch a hot cup of tea, how can heat transfer to your hand ?

.....

3 (A) Complete the following sentence :

A tissue is made up of a group of similar .....

(B) Answer the following questions :

1. What happens when one of the bulbs in a series circuit burns out ?

.....

2. What happens to the motion of particles in a substance when it is heated ?

.....

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3 Cairo Governorate — Mokattam Educational Zone

1 (A) Put (✓) or (✗) :

1. Animal cells and plant cells are similar in their shape and structure. ( )
2. Blood cells and proteins do not pass through nephrons. ( )
3. The magnet attracts all materials. ( )

(B) Give a reason for the following :

We feel hot when holding a hot cup of tea.

.....

2 (A) Complete the following using words in brackets :

The part of the cell responsible for generating energy is the .....

(golgi apparatus – mitochondria)

(B) Correct the underlined words :

1. A tissue is made up of a group of organs. (.....)
2. The transfer of heat by the movement of liquid and gas is called radiation. (.....)

3 (A) Choose the correct answer :

A magnet can be made from .....

a. iron. b. copper. c. plastic. d. glass.

(B) Write the scientific term :

1. A tool used to open and close an electric circuit. (.....)
2. Materials that do not allow heat to pass through easily. (.....)

4 Cairo Governorate — Heliopolis Educational Zone

1 (A) Complete the following :

1. When heating a substance, its molecules ..... thermal energy and the motion of molecules .....
2. From the opposite figure :

The brain receives information from ..... and sends a message to ..... in your hand to move it.

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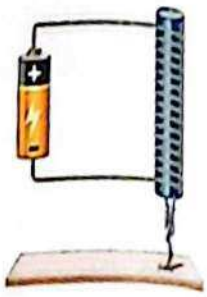
3. From the opposite figure :

The ..... energy changes into ..... energy, so it attracts the iron nails.



(B) Give a reason for the following :

The electric wire is made of copper and is covered with plastic.

.....

.....

---

2 (A) Choose the correct answer :

Magnetic force is ..... force(s), while gravitational force is ..... force only.

a. pulling – pulling and repulsion b. pushing – pulling and repulsion

c. pulling and repulsion – pulling

(B) What is the function of ...?

1. Nucleus : .....
2. Mitochondria : .....
3. Endoplasmic reticulum : .....
4. Cell membrane : .....

(C) Define :

1. Magnetic substances : .....
2. Excretion process : .....

---

3 (A) Put (✓) or (✗) :

Electric circuits in homes are connected in parallel. ( )

(B) Compare between :

1.

Point of comparison	Expansion	Contraction
Intermolecular spaces :	....	....

2.

Point of comparison	Kidneys	Stomach
Function :	....	....

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5 Cairo Governorate — Shubra Educational Zone

1 (A) Put (✓) or (✗) :

1. Bacteria and horse are considered multicellular organisms. ( )
2. Musculoskeletal system consists of muscular system and digestive system. ( )
3. Copper, rubber and iron are magnetic materials. ( )

(B) What happens if ...?

You touch a hot cup of tea. (according to the transfer of heat)

.....

2 (A) Choose the correct answer :

The tube which transports urine from the bladder to outside is called .....

a. vein. b. esophagus. c. urethra. d. artery.

(B) Write the scientific term :

1. A mixture of rocks, sand and water which becomes hard after it dries.

(.....)

2. A liquid in your mouth contains an enzyme which helps in the digestion process.

(.....)

3 (A) Cross the odd word :

Iron – Copper – Aluminum – Wood. (.....)

(B) Answer the following questions :

1. Give a reason for the following :

You feel the heat of the Sun although there is a space between the Sun and Earth.

.....

2. Mention the importance of :

Cell wall : .....

6 Giza Governorate — 6th October Educational Zone

1 (A) Put (✓) or (✗) :

1. Cell wall is made up of cellulose. ( )
2. Blood cells and proteins can pass through the kidney's nephrons. ( )
3. Electricity is a form of energy. ( )

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(B) What happens to ...?

The state of glass when it is heated at very high temperature.

.....

.....

2 (A) Choose the correct answer :

The organ which is responsible for secreting insulin hormone is the .....

a. gall bladder. b. pancreas. c. liver. d. stomach.

(B) Give reasons for :

1. Some electric circuits contain resistors.

.....

2. Engineers use expansion joints in the designing of bridges.

.....

3 (A) Cross out the odd word :

Cobalt – Copper – Nickel – Iron. (.....)

(B) Write the scientific term :

1. The way by which heat is transferred through solids only. (.....)
2. The component of the cell that allows the substances to enter and exit it. (.....)

7 Giza Governorate — South Giza Educational Zone

1 (A) Choose the correct answer for each of the following statements :

1. Heat transfers by convection in .....

a. iron. b. water. c. space.

2. The liver stores sugar and converts it into .....

a. protein. b. glycogen. c. fat.

3. ..... helps in collecting and transporting proteins to build and repair cells.

a. Nucleus b. Endoplasmic reticulum c. Mitochondria

(B) State the importance of each of the following :

1. Mitochondria : .....
2. Kidneys : .....

D.M.RAZK موقع الدكتور محمد رزق معلم الكيمياء التعليمي

2 (A) Write the scientific term :

The state at which the temperature of two bodies becomes equal, and the heat transfer stops among them. (.....)

(B) Give reasons for the following :

1. The heart muscle is considered as an involuntary muscle.

.....

2. Iron is attracted to the magnet, while rubber is not attracted to the magnet.

.....

3 (A) Complete the following sentence :

The ..... feature in the cell membrane controls the movement of materials in and out of the cell.

(B) Answer the following :

1. Compare between thermal expansion and thermal contraction.

Point of comparison	Thermal expansion	Thermal contraction
Definition :	....	....

2. What happens when a bulb in a parallel circuit burns out while it is connected with other bulbs?

.....

8 Giza Governorate — Oseem Educational Zone

1 (A) Choose the correct answer :

1. All the following living organisms bodies are built up of many cells, except .....
   a. human. b. fish. c. plant. d. bacteria.
2. Diabetes disease occurs due to a disorder in an organ of the ..... system.
   a. respiratory b. nervous c. endocrine d. urinary
3. The ..... is used to slow the flow of an electric current in the electric circuit.
   a. switch b. battery c. resistor d. lamp

(B) Write the scientific term :

It is the increase in the size of a substance due to an increase in its temperature. (.....)

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Part 3

2 (A) Correct the underlined word :

Magnetism is a pulling or pushing force, while gravity is a **pushing** force only. (.....)

(B) What happens ...?

1. If your body doesn't get rid of waste materials.

.....

2. To the mass of an amount of juice after freezing it.

.....

3 (A) Put (✓) or (✗) :

Cell biologists are scientists who study cells. ( )

(B) Give reasons for :

1. Blood cells and proteins can't pass through the kidney's nephrons.

.....

2. Expansion joints are used in the design of bridges.

.....

9 Giza Governorate — Omrania Educational Zone

1 (A) Choose the correct answer :

1. All the following living organisms bodies are built up of many cells, except .....

a. human. b. fish. c. plant. d. bacteria.

2. The two kidneys play an important role in the filtration of ..... inside your body.

a. water b. enzyme c. acid d. blood

3. The electric circuit contains a ..... which is responsible for opening and closing the circuit.

a. battery b. switch c. lamp d. resistor

(B) What happens to ...?

The speed of molecules of a matter when it is heated.

.....

2 (A) Write the scientific term :

They are cell organelles that provide the cell with the needed energy. (.....)

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(B) Put (✓) or (✗) :

1. The heart muscle is considered a voluntary muscle. ( )
2. Heat transfers from the hotter object to the cooler object. ( )

3 (A) Give a reason for the following :

Plant cells can make photosynthesis process.

.....

(B) Cross out the odd word :

1. Iron – Copper – Nickel – Cobalt. (.....)
2. Conduction – Convection – Friction – Radiation. (.....)

10 Alexandria Governorate — East Educational Zone

1 (A) Complete the following :

1. The ..... muscles are the muscles that move bones as they contract or relax.
2. The space of the cell is filled with a liquid called ..... in which the other cell parts float.
3. The flow of electric charges through an electric conductor is called .....

(B) Give a reason for the following :

The thermal energy of water is more than the thermal energy of ice.

.....

2 (A) Put (✓) or (✗) :

Nickel is a non-magnetic material. ( )

(B) What happens when ...?

1. Touching a non insulated wire in a closed circuit with your hand.

.....

2. Holding ice cube with your hand.

.....

3 (A) Write the scientific term :

They are microscopic filters in the kidneys that remove harmful substances. (.....)

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Part 3

(B) What is the importance of ...?

1. Selective permeability.

.....

2. Expansion joints in bridges.

.....

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موقع الدكتور
محمد رزق
التعليمي

امسح الباركود بالموبيل لتثبيت
التطبيق وتحميل كل الملازم مجانا وبسرعه

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